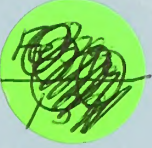


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INTRODUCTION

Willows, the genus *Salix*, are intimidating. The genus is very large, complex, and variable. From a taxonomic standpoint, it is one of the most difficult groups of plants. Hitchcock, et al., say that the reason for this is that taxonomic features, such as flowers (both male and female), fruits, and leaves are useful in keying, but are usually not all available. We have found this to be especially true with flowers and their catkins, which are usually (but far from always) present only for a few weeks in the spring. Differences between species are often subtle, but the variation within a given single species is sometimes very large. For example, vigorous young shoots sometimes have abnormally large leaves and stipules. Sometimes one finds both toothed and untoothed leaves on the same plant. Thus, keying willows seems like an awesome task and we tend to give up before we get started.

It is, however, essential for the modern resource manager to differentiate the willow species. Sophisticated riparian management demands that we do so.

Therefore, we have produced this technical bulletin. We have attempted to make it as “user friendly” as possible. Many willow keys are available, but we feel that the ones created by Robert Dorn (1970, 1984, 1988) are the best. Dr. Dorn has graciously given us permission to reproduce them herein. At his suggestion, we have divided his keys into five parts. Each part refers to a broad ecological zone in Montana: Plains, an amalgamation of western valleys and central/eastern foothills we call “Foothill/Valley,” Montane, Subalpine, and Alpine. Thus, someone working on the plains does not have to deal with mountain species and vice versa. A description of the ecological zones and generalized maps of them follow this introduction.

We have two keys for each region: one has been derived directly from Dr. Dorn, and the other has been translated into non-technical language for the layperson. The exercise of translation has very succinctly demonstrated the necessity for technical language: a great deal is lost in the translation and non-technical key separations get very bulky. For example, where Dr. Dorn said “...leaves lanceolate.....,” we had to say “...leaves spear-shaped with the widest part at the bottom....” We have also abridged Dr. Dorn’s keys to try to cut down on size. While this has been effective, it has also cut down on the accuracy and reliability of the layperson’s keys. Dr. Dorn carefully and laboriously wrote his keys to account for a maximum amount of intra-specific variation. Had we done this and not abridged the layperson’s keys, they would have been prohibitively bulky and very difficult to use. Thus, we would have defeated our purpose.

We have also put in a section called “Layperson’s Tips” with each specific description. These tips tell some of the diagnostic features of the species in non-technical language.

The rest of the species descriptions are organized into three categories: General, Vegetative Structures, and Sexual Structures. These were put in tabular form to make finding the description of a given structure (catkin, leaf, etc.) easier.

We have included a line drawing of every species. Sometimes we have used line drawings from two sources for the same species to illustrate different characteristics of that species. Line drawings are considered better than photographs for species identification because they emphasize the diagnostic characteristics of the species. The drawing alone, however, should never be used as the only source of species identification.

We have included maps showing the known distribution of most indigenous species (see Appendix B). We expect the ranges of many species to increase as the state is further botanically explored.

We have developed a glossary especially for Montana Willows. We put line drawings with as many of the definitions as possible, rather than have these illustrations on a separate page. It should be noted that different authors use different terminology for the same structure. For example, some say “ament” and others say “catkin.” We have included as many of these synonyms as possible in the glossary.

A single species may have several subspecies, varieties, and cultivars. We have avoided mention of these subspecific taxa wherever possible. Hitchcock et al., (1969) and Brunsfeld and Johnson (1985) have excellent discussions of these taxa and should be consulted if such information is desired.

Hybrids between two species are possible. This is especially true with exotic species such as White Willow and Crack Willow. Brunsfeld and Johnson (1985), however, did not find hybridizations of native species a problem in east-central Idaho, and it is reasonable to assume that it is likewise usually not a problem in western Montana. We could find little about species crossing in eastern Montana, but suspect that it is not a problem there either. Therefore, we have not herein considered hybridization.

A given species might appear in as many as four of the five ecological zone keys. This is because many species have a wide ecological amplitude and are not restricted to any single ecological zone. This has reduced the effectiveness of the division into ecological zone concept, but there still has been a significant reduction in key size. For example, there are 22 species in the Subalpine Ecological Zone Key (the largest number of species in any zone), while this bulletin covers 37 species.

Despite our best efforts, keying willows is still difficult.

Ability that must be gained by experience is often required. For instance, how tangled, matted hairy must a leaf surface be before it is called "tomentose" and not simply "pubescent?" Only experience with examining the hair on willow leaves will tell in many cases.

Dr. Dorn (1970) states "...no one key can be used to identify all individual willow plants because of their extensive variability...." He goes on to offer the following advice with which we can use his keys successfully most of the time:

- a. "The material to be keyed should have either mature female catkins or mature leaves; catkins are preferable. Abnormal material including "sucker shoots" should be avoided. Several different catkins and different leaves should be checked while keying."
- b. "The area where the plant was found should be surveyed to determine the variability, if any, of the species. Several specimens from the area are better than only one. The area to be surveyed might include a swamp, a mountain top, or a small drainage."
- c. "The material to be keyed should be fresh; the plant should preferably be keyed in the field."
- d. "A hand lens of 10 power or more is desirable for detecting the smaller characteristics."
- e. "The material should be keyed on both flower and vegetative characters when possible. This will serve as a check. Flower characteristics are usually more reliable in case of disagreement."

Other advice we add is:

1. Bring a small ruler and plant press with you in the field, especially in the spring.
2. When you arrive at a given species in the key, go to the description of that species and check all characteristics to be certain that you are correct.
3. Other recommended keys are contained in Hitchcock, et al. (1969), and Brunsfeld and Johnson (1985) for western Montana and "Great Plains Flora Association" (1986) for eastern Montana. One should use these in the office in conjunction with a dissecting microscope.

In summary, one must be tenacious and willing to devote time and effort when keying willows. There is no easy way to key willows; hopefully, this technical bulletin is the least difficult.

DESCRIPTION OF THE ECOLOGICAL ZONES

The Ecological Zones are based on Lackschewitz (1986), Kuchler (1964) and Lesica (1991). Four of the zones come from Lackschewitz: Alpine, Subalpine, (including Timberline, Upper Subalpine, and Lower Subalpine), Montane (including Montane Moist and Montane Dry), and Foothills/Valley (called Major Valley by Lackschewitz). We have added Plains to encompass much of central and eastern Montana.

Ecological Zone is determined by a combination of elevation, latitude, aspect, topography, and other factors. Merely giving a range of elevation for a given zone will not suffice because these factors are very interrelated. Therefore, we will herein give the major species of plants that are found in the zones.

The Plains Ecological Zone, according to Lesica (1991), is vegetated by mid-grass grasslands and shrublands dominated by Wyoming Big Sagebrush, Needle and Threadgrass, Western Wheatgrass, Blue Grama, and Bluebunch Wheatgrass. Riparian areas are dominated by Cottonwood, Green Ash, and Willow. Stands of Ponderosa Pine Woodland and sometime Douglas-fir occur on fractured bedrock.

The Foothill/Valley Ecological Zone occupies the western valleys and rolling foothills throughout the state. The zone is dominated by Ponderosa Pine savannah and/or bunch grasses such as Bluebunch Wheatgrass and Idaho Fescue. Big Sagebrush dominates drier sites. Savannahs of Limber Pine and Rocky Mountain Juniper are common on slopes in the southwest and south-central regions.

The Montane Zone occurs mostly in the western part of the state and in scattered upland disjuncts in the central part. It is dominated by Douglas-fir and Lodgepole Pine. Cool, more mesic slopes support Englemann Spruce and Subalpine Fir. Species found west of the Continental Divide include Western Larch and Western White Pine.

Climax vegetation in the Subalpine Zone is usually a Subalpine Fir and/or Englemann Spruce Forest. Fires have often caused a pyric disclimax forest of Lodgepole Pine. This pine often is in a thick, "dog hair" stand with little understory. Unless there is a fire, however, the climax trees will come in as the pines become senescent.

The Alpine Zone is above the treeline. It is tundra or scree. Dominant plants found here include sedge, bluegrass, Sheep Fescue, cinquefoil, and small shrubs as Alpine Avens, Shrub Cinquefoil, and dwarf willows.

MAPS OF ECOLOGICAL ZONES



LEGEND

- 1 - Plain
- 2 - Foothill Valley
- 3 - Mountain
- 4 - Subalpine
- 5 - Alpine

LEGEND

- 1 - Plain
- 2 - Foothill Valley
- 3 - Mountain
- 4 - Subalpine
- 5 - Alpine

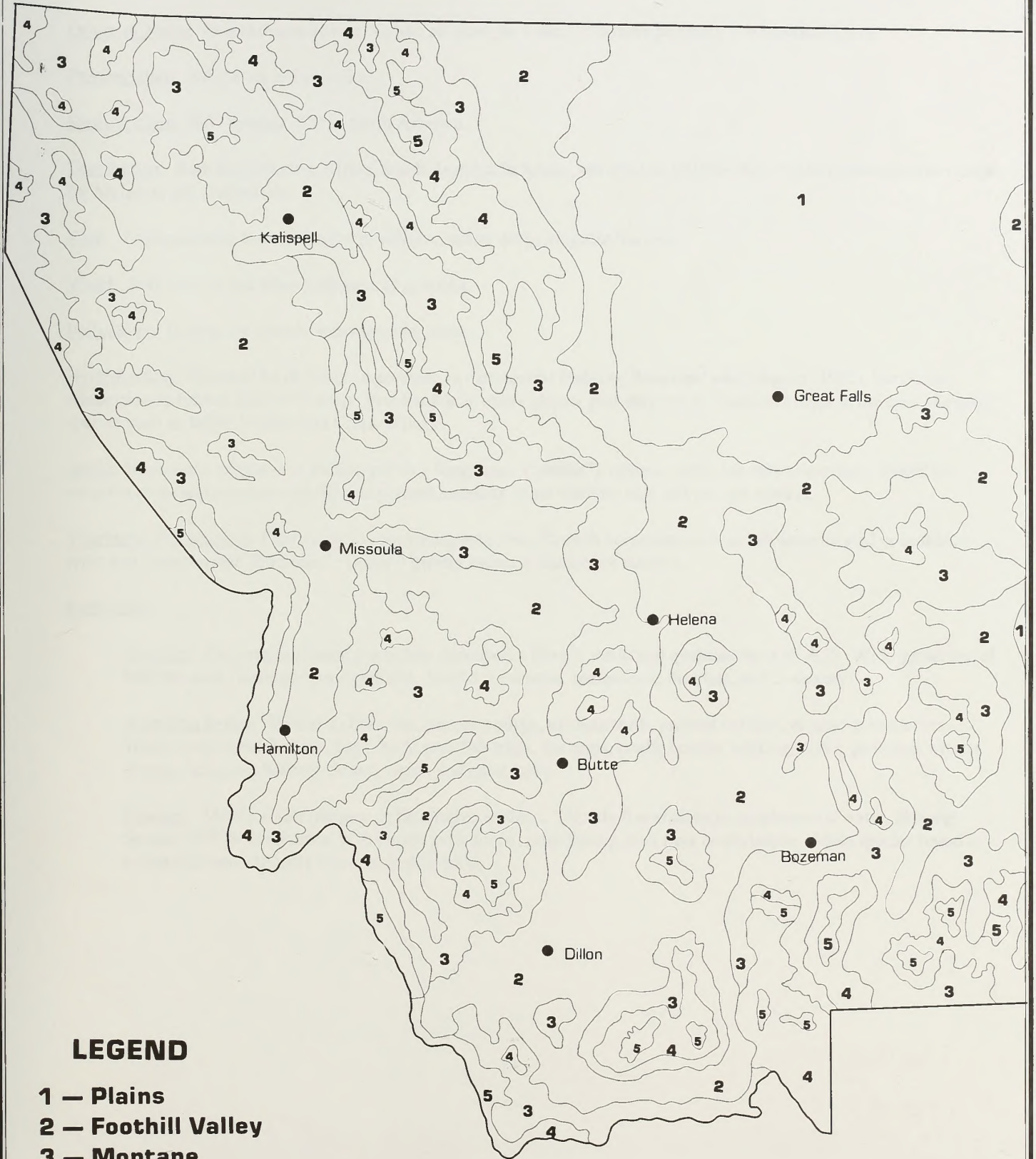
ECOLOGICAL ZONES



LEGEND

- 1 — Plains
- 2 — Foothill Valley
- 3 — Montane
- 4 — Subalpine
- 5 — Alpine

ECOLOGICAL ZONES



LEGEND

- 1 — Plains
- 2 — Foothill Valley
- 3 — Montane
- 4 — Subalpine
- 5 — Alpine

FACTS ABOUT WILLOWS (SALIX)

Origin of Name: One author says it is "Celtic; sal-near, lis water," but more probably it is classical Latin.

Pronunciation: SA ('a' as in fate) -liks.

Size of genus: 300+ species, 100 in North America

Distribution: Both hemispheres; Africa, South America to Arctic; sea level to 10,000+ feet. Nearly cosmopolitan except for Malaysia and Australasia.

Bark: Young smooth, brown to olive to yellow; mature deep, irregular furrows.

Wood: Soft, easy to cut, often very rapidly growing.

Pollination: Usually by insects, sometimes by wind.

Hybridization: Found to be of minor importance in east-central Idaho by Brunfeld and Johnson (1985), but occurs where closely related species overlap. Problematic in many places, probably not in Montana except in the case of exotic species such as White Willow and Crack Willow.

Seeds: Numerous, minute (2-3 million per lb.), long, hairy ("cotton"), remain viable for only a few days, should be stored at room temperature with 50 plus percent humidity (then viability may last several weeks).

Vegetative Propagation: Fairly easy to root young branches. Growth hormones such as indoleacetic acid or indolebutyric acid (commercial "Rootone," "Dexol") greatly increase chances of success.

Early Uses:

Eurasian: Dioscorides (Greek physician) described willow's medicinal qualities circa 60 A.D. Widespread use of bark for tonic, astringent, antiperiodic. Useful for worms, indigestion, diarrhea, and dysentery.

American Indian: Similar to Eurasian, also as a purge, to clean teeth, prevent cavities, or relieve headaches. Wood, twigs used for pins, pegs, backrests, fish traps, fox traps, cradle boards, walking sticks, gambling wheels, stirrups, scrapers, baskets, drums, ropes, and meat racks.

Ecology: Mostly either obligate or facultative wetland. Usually found close to supplemental water, although Scouler Willow is common in the more xeric forest, establishing after fires or avalanche. Most species found in cooler climates. Usually mesic to hydric soils.

PLAINS ECOLOGICAL ZONE KEY

(Most separations courtesy of Robert Dorn)

- 1a. Trees, usually with one main trunk at the ground level; introduced or native
 - 2a. Twigs pendulous, introduced, usually obviously planted
 - 3a. Twigs olive or brown. . . *S. babylonica*
 - 3b. Twigs yellow or yellow green. . . *S. alba* var *tristis*
 - 2b. Twigs spreading or ascending, introduced or native
 - 4a. Leaves usually yellow green and dull dorsally, glaucous ventrally; bud scales with free overlapping margins; native. (Note - if catkins are precocious, key as a shrub)
. . . *S. amygdaloides*
 - 4b. Leaves usually dark green, shiny dorsally, glaucous or pale ventrally; bud scales without free overlapping margins, introduced, often obviously planted.
 - 5a. Twigs not brittle at base; glandular processes not present on petioles near base of leaf blade or occasionally present on a few; leaves elliptic to lanceolate. . . *S. alba*
 - 5b. Twigs either brittle and easily broken off at the base or glandular processes present on most petioles near base of leaf blade or both, leaves various.
 - 6a. Leaves narrowly-elliptic to lanceolate, more than 3 times as long as wide, usually glaucous ventrally. . . *S. fragilis*
 - 6b. Leaves broadly-lanceolate to ovate, abruptly acuminate, less than 3 times as long as wide, pale ventrally. . . *S. pentandra*
- 1b. Shrubs, several to many stems at the ground level; native
 - 7a. Leaves linear or linear-elliptic, 6 times or more as long as wide, usually less than 1.2 cm wide; twigs not tomentose, the older usually with the outer transparent surface flaking off; scales deciduous in fruit
. . . *S. exigua*
 - 7b. Leaves not linear, width various, usually less than 6 times as long as wide or, if more, twigs tomentose or the older without the outer transparent surface flaking off; scales various.
 - 8a. Leaves about equally green on both sides. . . *S. lasiandra*
 - 8b. Leaves obviously lighter ventrally
 - 9a. Plants with mature pistillate catkins
 - 10a. Capsules glabrous
 - 11a. Bracts dark, persistent in fruit. . . *S. lutea*
 - 11b. Bracts yellow, green, or whitish, deciduous in fruit
 - 12a. Capsules mostly 7 mm long or less, maturing in spring. . . *S. lasiandra*
 - 12b. Capsules mostly 7-11 mm long, maturing in late summer. . . *S. serissima*
 - 10b. Capsules pubescent
 - 13a. Leaves mostly over 5 times as long as wide, usually sharply serrate; styles .1-.3 mm long. . . *S. petiolaris*
 - 13b. Leaves mostly less than 5 times as long as wide, if as much as 5 times as long as wide, not sharply serrate and the styles .3-.8+ mm long. . . *S. discolor*
 - 9b. Plants without mature pistillate catkins, leaves mature
 - 14a. Petioles usually with glands near base of leaf blade; leaf tips usually long, acuminate
 - 15a. Leaves mostly over 4 times as long as wide. . . *S. lasiandra*
 - 15b. Leaves mostly less than 4 times as long as wide. . . *S. serissima*
 - 14b. Petioles usually without glands; leaves mostly acute or rounded
 - 16a. Older twigs somewhat silvery-gray, leaves mostly lanceolate. . . *S. lutea*
 - 16b. Older twigs not silvery-gray, leaves mostly elliptic, oblanceolate, or ovate
 - 17a. Leaves usually 5 times or more as long as wide, sharply serrate
. . . *S. petiolaris*
 - 17b. Leaves mostly less than 5 times as long as wide, mostly crenate
. . . *S. discolor*

FOOTHILLS/VALLEY ECOLOGICAL ZONE KEY

(Most separations courtesy of Robert Dorn)

- 1a. Trees, usually with one main trunk at the ground level; introduced or native
 - 2a. Twigs pendulous, introduced, usually obviously planted
 - 3a. Twigs olive or brown. . .*S. babylonica*
 - 3b. Twigs yellow or yellow green. . .*S. alba* var *tristis*
 - 2b. Twigs spreading or ascending, introduced or native
 - 4a. Leaves usually yellow green and dull dorsally, glaucous ventrally, native. (Note: if catkins are precocious, key as a shrub). . .*S. amygdaloides*
 - 4b. Leaves usually dark green, shiny dorsally, glaucous or pale beneath; introduced, often obviously planted
 - 5a. Twigs not brittle at base; glandular processes not present on petioles near base of leaf blades or occasionally present on a few; leaves elliptic to lanceolate. . .*S. alba*
 - 5b. Twigs either brittle and easily broken off at the base or glandular processes present on most petioles near base of leaf blades or both; leaves various.
 - 6a. Leaves narrowly-elliptic to lanceolate, more than 3 times as long as than wide, usually glaucous ventrally. . .*S. fragilis*
 - 6b. Leaves broadly-lanceolate to ovate, more abruptly acuminate, less than 3 times as long as wide, pale ventrally. . .*S. pentandra*
- 1b. Shrubs, several to many stems at the ground level; native.
 - 7a. Leaves linear or linear-elliptic, 6 times or more as long as wide, usually less than 1(1.2) cm wide; twigs not pruinose or tomentose, the older usually with the outer transparent surface flaking off; scales deciduous in fruit. . .*S. exigua*
 - 7b. Leaves not linear, width various, usually less than 6 times as long as wide or, if more, twigs pruinose or tomentose or the older without the outer transparent surface flaking off; scales various
 - 8a. Twigs of the previous year, and sometimes of the current season, pruinose, sometimes only apparent at nodes especially behind buds
 - 9a. Catkins 1.5-6 cm long, densely flowered, sessile or nearly so; leaves usually silvery pubescent ventrally, green and glabrous or glabrate dorsally. . .*S. drummondiana*
 - 9b. Catkins .8-2.5 cm, loosely flowered, with leafy floriferous branchlets; leaves green sericeous on both sides. . .*S. geyeriana*
 - 8b. Twigs not pruinose
 - 10a. Leaves about equally as green on both sides
 - 11a. Plants with mature pistillate catkins
 - 12a. Scales yellow, deciduous in fruit; petioles with glands near base of leaf on upper side. . .*S. lasiandra*
 - 12b. Scales dark, persistent in fruit; petioles lacking glands. . .*S. monochroma*
 - 11b. Plants without mature pistillate catkins, with mature leaves
 - 13a. Mature leaves lanceolate and long acuminate; petioles with glands near the tip . . .*S. lasiandra*
 - 13b. Mature leaves sometimes lanceolate but not long acuminate; petioles usually lacking glands. . .*S. monochroma*
 - 10b. Leaves obviously lighter ventrally
 - 14a. Leaves narrowly elliptic, oblong, oblanceolate, or obovate, usually very densely white or silvery hairy ventrally, glabrous or glabrate and green dorsally.
 - 15a. Pistillate catkins sessile or nearly so, leaves mostly narrowly elliptic . . .*S. drummondiana*
 - 15b. Pistillate catkins with leafy branchlets 5-20 mm long, leaves mostly oblanceolate to obovate. . .*S. sitchensis*
 - 14b. Leaves not as above
 - 16a. Plants with mature pistillate catkins
 - 17a. Capsules glabrous
 - 18a. Scales yellow, green or whitish, deciduous in fruit

- 19a. Capsules mostly 7 mm long or less, maturing in spring, streambanks and ditches. . . *S. lasiandra*
- 19b. Capsules 7-12 mm long when mature, maturing in late summer; swamps and bogs. . . *S. serissima*
- 18b. Scales often dark, persistent in fruit. . . *S. lutea*
- 17b. Capsules pubescent
 - 20a. Leaf blades mostly 5 or more times as long as wide, usually sharply serrate; styles .1-.3 mm long. . . *S. petiolaris*
 - 20b. Leaf blades, if as much as 5 times as long as wide, not sharply serrate, and the styles .3-1.5 mm long.
 - 21a. Stipes mostly 2-5 mm long; styles .4 mm or less long; twigs of year usually red-purple and appressed hairy; bark of older twigs cracked giving a white streaked appearance . . . *S. bebbiana*.
 - 21b. Stipes mostly 2 mm or less long, or if as long as 3 mm, the styles often over .4 mm long and the twigs not as above.
 - 22a. Plants mostly to 1.5 m high, the pistillate catkins coetaneous on leafy floriferous branchlets .2-1 cm long; leaves and twigs often hairy. . . *S. brachycarpa*
 - 22b. Plants often over 1.5 m high, the pistillate catkins precocious, sessile, or nearly so or sometimes with branchlets to 13 mm; leaves and twigs glabrous to hairy.
 - 23a. Twigs of previous year glabrous; leaves, if present, elliptic, wet places. . . *S. discolor*
 - 23b. Twigs of previous year sometimes hairy; leaves, if present, obovate to oblanceolate; often in drier woods and clearings, occasionally on shores. . . *S. sconleriana*
- 16b. Plants without mature pistillate catkins, with mature leaves
 - 24a. Petioles usually with glands near base of leaves; leaf tips mostly long-acuminate
 - 25a. Leaves mostly over 4 times as long as wide. . . *S. lasiandra*
 - 25b. Leaves mostly less than 4 times as long as wide. . . *S. serissima*
 - 24b. Petioles usually without glands; leaf tips mostly acute or rounded
 - 26a. Twigs of the year usually red-purple and appressed-hairy; bark of older twigs cracked giving a white-streaking appearance; mature buds with depressed margins. . . *S. bebbiana*
 - 26b. Twigs and buds not as above
 - 27a. Plants with mostly oblanceolate to obovate leaves; freshly stripped bark of living twigs of previous year usually with a "skunky" odor; usually over 2 m high; often in dryer woods . . . *S. sconleriana*
 - 27b. Plants not as above
 - 28a. Leaves mostly entire or nearly so. . . *S. brachycarpa*
 - 28b. Leaves mostly toothed
 - 29a. Older twigs somewhat silvery-gray; leaves mostly lanceolate. . . *S. lutea*
 - 29b. Older twigs not silvery-gray; leaves often predominantly elliptic, oblanceolate, or ovate
 - 30a. Leaves usually 5 times or more as long as wide, sharply serrate. . . *S. petiolaris*
 - 30b. Leaves mostly less than 5 times as long as wide, mostly crenate. . . *S. discolor*

MONTANE ECOLOGICAL ZONE KEY

(Separations courtesy of Robert Dorn)

- 1a. Leaves linear or linear-elliptic, 6 times or more as long as wide, usually less than 1(1.2) cm wide; twigs not pruinose or tomentose, the older usually with the outer transparent surface flaking off; scales deciduous in fruit
 - 2a. Leaves green on both sides, often pubescent, scales often lanceolate or lance-linear, pubescent or sometimes glabrate. . .*S. exigua*
 - 2b. Leaves usually glaucous or glaucescent ventrally, glabrous when expanded; scales broader than 2a, glabrous or sometimes pubescent at base. . .*S. melanopsis*
- 1b. Leaves not linear, width various, usually less than 6 times as long as wide or, if more, twigs pruinose or tomentose or the older without the outer transparent surface flaking off; scales various
 - 3a. Twigs pruinose, sometimes only apparent at nodes especially behind buds
 - 4a. Catkins 1.5-6 cm long, densely flowered, sessile or nearly so; stipes .1-.8 mm long; leaves usually densely silvery pubescent ventrally, green and glabrous or glabrate dorsally. . .*S. drummondiana*
 - 4b. Catkins .8-2.5 cm long, loosely flowered with leafy, branchlets 2-18 mm long; stipes 1-3 mm long; leaves not as above
 - 5a. Leaves about equally green and sericeous on both sides; scales mostly tan or brown . . .*S. geyeriana*
 - 5b. Leaves green and glabrate dorsally, mostly glaucous ventrally; scales mostly black or dark brown. . .*S. lemmonii*
 - 3b. Twigs not pruinose
 - 6a. Leaves about equally green on both sides
 - 7a. Plants with mature pistillate catkins
 - 8a. Capsules pubescent. . .*S. wolfii*
 - 8b. Capsules glabrous
 - 9a. Scales yellow, green or whitish, deciduous in fruit; petioles with glands near base of leaves on upper side. . .*S. lasiandra*
 - 9b. Scales often dark, persistent in fruit; petioles usually lacking glands. . .*S. wolfii*
 - 10a. Styles 1-3 mm long; some catkins at tips of twigs of previous year . . .*S. tweedyi*
 - 10b. Styles .2-1.3 (1.5) mm long; no catkins at tips of twigs of previous year
 - 11a. Catkins mostly .8-2 cm long; stipes 0-.8 mm long
 - 11b. Catkins mostly (1)2-9 cm long; stipes (.3).5-4 mm long . . .*S. boothii*
 - 7b. Plants without mature pistillate catkins, with mature leaves
 - 12a. Mature leaves lanceolate and long-acuminate at tip; petioles with glands near the base of the blade . . .*S. lasiandra*
 - 12b. Leaves sometimes lanceolate but not long-acuminate; petioles usually lacking glands
 - 13a. Leaves broadly elliptic, ovate or obovate, very finely glandular-toothed; twigs spreading pubescent. . .*S. tweedyi*
 - 13b. Leaves often elliptic, lanceolate, or oblanceolate, entire or toothed, sometimes glandular; twigs various
 - 14a. Plants mostly less than 2 m high; mature leaves often densely silvery pubescent. . .*S. wolfii*
 - 14b. Plants often over 2 m high; mature leaves mostly sparsely pubescent to glabrous. . .*S. boothii*
 - 6b. Leaves lighter ventrally
 - 15a. Leaves narrowly elliptic, oblong, oblanceolate, or obovate; usually very densely white or silvery pubescent ventrally, glabrous or glabrate and green dorsally
 - 16a. Leaves white hairy ventrally, twigs pubescent. . .*S. candida*
 - 16b. Leaves silvery hairy ventrally, twigs glabrous or pubescent.
 - 17a. Pistillate catkins sessile or nearly so; leaves mostly narrowly elliptic . . .*S. drummondiana*

- 17b. Pistillate catkins with leafy branchlets 5-20 mm long; leaves mostly oblanceolate to obovate. . .*S. sitchensis*
- 15b. Leaves not as above
 - 18a. Plants with mature pistillate catkins
 - 19a. Capsules glabrous
 - 20a. Scales yellow, green, or whitish, deciduous in fruit. . .*S. lasiandra*
 - 20b. Scales often dark, persistent in fruit
 - 21a. Stipes .3-2 mm long; catkins on floriferous branchlets 3-15 mm long; leaves usually glabrous, elliptic to elliptic-obovate, often entire. . .*S. farriae*
 - 21b. Stipes, catkins, and leaves without the characteristics combined as above. . .*S. pseudomonticola*
 - 22a. Catkins, or some of them, at tips of twigs of previous year; styles 1-3 mm long; leaves finely glandular-toothed. . .*S. tweedyi*
 - 22b. Catkins not at tips of twigs of previous year; styles .5-1.8 mm long;. . .*S. pseudomonticola*
 - 19b. Capsules pubescent
 - 23a. Stipes mostly 2-5 mm long; styles .4 mm or less long; twigs of the year usually red-purple and appressed pubescent; bark of older twigs cracked giving a white streaking appearance. . .*S. bebbiana*
 - 23b. Stipes 2 mm or less long, or if as long as 3 mm, the styles often over .4 mm long and twigs not as above
 - 24a. Plants mostly to 1.5 m high; pistillate catkins coetaneous on leafy floriferous branchlets .2-1 cm long; leaves and twigs often pubescent. . .*S. brachycarpa*
 - 24b. Plants often over 1.5 m high; pistillate catkins precocious or coetaneous, sessile or sometimes with floriferous branchlets to 13 mm long; leaves and twigs pubescent or glabrous
 - 25a. Pedicels 0-2 mm long; leaves elliptic or narrowly oblanceolate and often entire; twigs of the previous year chestnut to red to red purple, usually shiny; stigmas less than .5 mm long
 - 25b. Pedicels .8-3 mm long; leaves obovate to broadly oblanceolate, or if elliptic, then usually coarsely toothed; twigs of previous year yellowish to reddish-brown, dull; stigmas usually over .5 mm long. . .*S. scouleriana*
- 18b. Plants without mature pistillate catkins, with mature leaves
 - 27a. Petioles usually with glands near base of leaves/blades; leaf tips mostly long-acuminate. . .*S. lasiandra*
 - 27b. Petioles usually without glands; leaf tips mostly acute to rounded
 - 28a. Twigs of the year usually red-purple and appressed pubescent, bark of older twigs cracked giving a white-streaking appearance; mature buds with depressed margins. . .*S. bebbiana*
 - 28b. Twigs and buds not as above
 - 29a. Plants with mostly oblanceolate to obovate leaves; freshly stripped bark from twigs of the previous year usually with a skunky odor; shrub or tree over 2 m high; often in dryer woods and clearings . . .*S. scouleriana*
 - 29b. Plants not as above
 - 30a. Leaves entire or nearly so
 - 31a. Leaves glabrous or nearly so

- 32a. Leaves mostly 5 times as long as wide
 . . . *S. lemmonii*
- 32b. Leaves mostly less than 5 times as long as wide
 - 33a. Twigs usually shiny and reddish, dorsal leaf surface shiny. . . *S. planifolia* var *planifolia*
 - 33b. Twigs mostly dull brownish, greenish or blackish; dorsal leaf surface dull
 . . . *S. farriae*
- 31b. Leaves tomentose. . . *S. brachycarpa*
- 29b. Most leaves serrate
 - 34a. Leaves only slightly lighter beneath, very finely glandular toothed, twigs of the year with long spreading pubescence
 . . . *S. tweedyi*
 - 34b. Leaves glaucous ventrally, often coarsely toothed; twigs of the year often glabrous or with appressed pubescence
 - 35a. Leaves mostly elliptic, dark green, and shiny dorsally; twigs usually reddish and shiny
 . . . *S. planifolia* var *planifolia*
 - 35b. Leaves mostly lanceolate to ovate to obovate, if elliptic, the leaves usually not shiny dorsally and the twigs not reddish and shiny. . . *S. pseudomonticola*

SUBALPINE ECOLOGICAL ZONE KEY

(Separations Courtesy of Robert Dorn)

- 1a. Plants usually 8 cm tall or less. Sometimes taller in *S. arctica*
 - 2a. Leaf blades 7(9) mm or less long, not glaucous; capsules glabrous, usually on limestone. . . *S. rotundifolia*
 - 2b. Leaf blades mostly over 7 mm long, often glaucous beneath; capsules hairy.
 - 3a. Leaf tip usually rounded; the blade prominently reticulate, veined beneath; styles less than .5 mm long. . . *S. reticulata*
 - 3b. Leaf tip usually pointed, the blade usually not reticulate-veined; styles .3-2 mm long. . . *S. arctica*
- 1b. Plants more than 8 cm tall.
 - 4a. Leaves linear or linear-elliptic, 6 times or more as long as wide, usually less than 1(1.2) cm wide; twigs not pruinose or tomentose, the older usually with the outer transparent surface flaking off; scales deciduous in fruit
 - 5a. Leaves green on both sides, often pubescent, scales often lanceolate or lance-linear, pubescent, or sometimes glabrate. . . *S. exigua*
 - 5b. Leaves usually glaucous or glaucescent ventrally, glabrous when expanded; scales broader than 2a, glabrous, or sometimes pubescent at base. . . *S. melanopsis*
 - 4b. Leaves not linear, width various, usually less than 6 times as long as wide or, if more, twigs pruinose or tomentose or the older without the outer transparent surface flaking off; scales various.
 - 6a. Twigs pruinose, sometimes only apparent at nodes especially behind buds
 - 7a. Catkins 1.5-6 cm long, densely flowered, sessile or nearly so; stipes .1-.8 mm long; leaves usually densely silvery pubescent beneath, green and glabrous or glabrate above . . . *S. drummondiana*
 - 7b. Catkins .8-2.5 cm long, loosely flowered, with leafy floriferous branchlets 2-18 mm long; stipes 1-3 mm long; leaves not as above
 - 8a. Leaves about equally green and sericeous on both sides; scales mostly tan or brown . . . *S. geyeriana*
 - 8b. Leaves green and glabrate above, mostly glaucous beneath; scales mostly black or dark brown. . . *S. lemmonii*
 - 6b. Twigs not pruinose
 - 9a. Leaves about equally green on both sides
 - 10a. Plants with mature pistillate catkins
 - 11a. Capsules pubescent
 - 12a. Styles 1-2.5 mm long; twigs glutinous; catkins sessile or nearly so, some at the tips of twigs of the previous year. . . *S. barrattiana*
 - 12b. Styles .2-1.9 mm long; twigs not glutinous; catkins not at the tips of twigs of the previous year, subsessile or with floriferous branchlets to 20 mm long
 - 13a. Catkins 1-5 cm long; young leaves with prominently glandular margins. . . *S. eastwoodiae*
 - 13b. Catkins .8-2 cm long; young leaves usually lacking glands on margins. . . *S. wolfii* var *idahoensis*
 - 11b. Capsules glabrous
 - 14a. Styles 1-3 mm long; some catkins at tips of twigs of the previous year . . . *S. tweedyi*
 - 14b. Styles .2-1.5 mm long; catkins not at the tips of twigs of the previous year
 - 15a. Catkins mostly .8-2 cm long; stipes 0-.8 mm long. . . *S. wolfii* var *wolfii*
 - 15b. Catkins mostly 1-9 cm long; stipes .3-4 mm long. . . *S. commutata*
 - 16a. Leaves of branchlets little reduced (if at all), the branchlets 8-30 mm long; leaf blades mostly ovate, broadly elliptic, or obovate, often densely pubescent with long loose hairs . . . *S. commutata*

- 16b. Leaves of branchlets usually much reduced, the peduncle 2(1) to 10(15) mm long; leaf blades mostly lanceolate, narrowly elliptic, or oblanceolate or rarely ovate or obovate, sparsely pubescent to glabrous. . . *S. boothii*
- 10b. Plants without mature pistillate catkins, with mature leaves
 - 17a. Twigs glutinous, staining pressing papers yellow or green. . . *S. barrattiana*
 - 17b. Twigs not glutinous
 - 18a. Leaves broadly elliptic, ovate, or obovate, very finely glandular-toothed; twigs of the year with long, spreading pubescence. . . *S. tweedyi*
 - 18b. Leaves often elliptic, lanceolate, or oblanceolate, entire or toothed; sometimes also glandular; twigs various
 - 19a. Young leaves with prominently glandular margins . . . *S. eastwoodiae*
 - 19b. Young leaves often without glandular margins
 - 20a. Leaves mostly broadly elliptic, ovate, or obovate, often densely pubescent with long, loose hairs. . . *S. commutata*
 - 20b. Leaves mostly lanceolate or elliptic, glabrous or pubescent
 - 21a. Plants mostly less than 2 m high; mature leaves often densely silvery pubescent. . . *S. wolfii*
 - 21b. Plants often over 2 m high; mature leaves mostly sparsely pubescent to glabrous. . . *S. boothii*
 - 9b. Leaves obviously lighter ventrally than dorsally
 - 22a. Leaves elliptic-obovate to oval, mostly leathery, dark green dorsally, silvery hairy ventrally (becoming glabrate; some catkins at tips of twigs of the season . . . *S. vestita*
 - 22b. Leaves and catkins not as above
 - 23a. Leaves narrowly elliptic, oblong, oblanceolate, or obovate usually very densely white or silvery pubescent ventrally, glabrous or glabrate and green dorsally; stipes 1 mm or less long
 - 24a. Leaves white hairy ventrally, twigs pubescent. . . *S. candida*
 - 24b. Leaves silvery hairy ventrally, twigs glabrous or pubescent . . . *S. drummondiana*
 - 23b. Leaves not as above; stipes various
 - 25a. Plants with mature pistillate catkins
 - 26a. Capsules glabrous
 - 27a. Stipes .3-2 mm long; catkins on branchlets 3-15 mm long; leaves usually glabrous, elliptic to elliptic-obovate, often entire. . . *S. farriar*
 - 27b. Stipes, catkins, and leaves without characteristics combined as above
 - 28a. Catkins on branchlets 1-3 cm long . . . *S. barclayi*
 - 28b. Catkins sessile or on branchlets .8-1.2 cm long
 - 29a. Catkins, or some of them, at tips of twigs of the previous years styles 1-3 mm long; leaves finely glandular toothed. . . *S. tweedyi*
 - 29b. Catkins not at the tips of twigs of the previous year, styles .5-1.8 mm long; leaves crenate-serrate . . . *S. pseudomonticola*
 - 26b. Capsules pubescent
 - 30a. Styles 1-2.5 mm long; twigs glutinous; catkins sessile or nearly so, some at tips of twigs of the previous year. . . *S. barrattiana*

- 30b. Styles, twigs, and catkins not combined as above
 - 31a. Plants mostly to 1.5 m high, pistillate catkins coetaneous on leafy, floriferous branchlets 2-25 mm long; leaves and twigs often pubescent
 - 32a. Pistillate catkins .5-2 cm long; floriferous branchlets .2-1 cm long; stipes less than .5 mm long; petioles mostly 1-3 mm long. . . *S. brachycarpa*
 - 32b. Pistillate catkins (1.5) 2-5 cm long; branchlets 5-25 mm long; stipes 0-1.5 mm long; petioles often over 3 mm long. . . *S. glauca*
 - 31b. Plants often over 1.5 m high; pistillate catkins precocious or coetaneous, sessile or nearly so or sometimes with floriferous branchlets to 13 mm long; leaves and twigs glabrous or pubescent
 - 33a. Pistillate catkins with leafy floriferous branchlets to 1 cm long; rarely subsessile; stipes .5-2 mm long; styles .2-.7 mm long. . . *S. lemmonii*
 - 33b. Pistillate catkins sessile to subsessile; stipes .1 mm long, styles .4-1.5 mm long. . . *S. planifolia*
- 25b. Plants without mature pistillate catkins, with mature leaves
 - 34a. Twigs glutinous, staining pressing papers yellow or green . . . *S. barrattiana*
 - 34b. Twigs not glutinous
 - 35a. Most leaves entire or nearly so
 - 36a. Leaves glabrous or nearly so
 - 37a. Leaves mostly 5 times or more as long as wide. . . *S. lemmonii*
 - 37b. Leaves mostly less than 5 times as long as wide
 - 36a. Twigs usually shiny and reddish; upper leaf surface shiny. . . *S. planifolia*
 - 38b. Twigs mostly dull brownish, greenish, or blackish; leaf surface dull . . . *S. farriae*
 - 36b. Leaves usually obviously pubescent, rarely glabrate
 - 39a. Leaves 1.5-7 cm long, usually sparsely to moderately pubescent; petioles mostly over 3 mm long. . . *S. glauca*
 - 39b. Leaves .5-4 cm long, usually densely pubescent; petioles mostly less than 3 mm long. . . *S. brachycarpa*
 - 35b. Most leaves serrate
 - 40a. Leaves only slightly lighter beneath, very finely glandular toothed; twigs of the year with long, spreading pubescent. . . *S. tweedyi*
 - 40b. Leaves glaucous ventrally, often more coarsely toothed; twigs often glabrous or with appressed hairs
 - 41a. Leaves mostly elliptic, dark green and shiny above; twigs usually reddish and shiny. . . *S. planifolia*

- 41b. Leaves mostly lanceolate to ovate or obovate, if elliptic, the leaves not shiny above and the twigs not reddish and shiny
- 42a. Leaf midrib and petiole often red, blade usually ovate, obovate, or broadly elliptic, twigs of the year pubescent. . . *S. pseudomonticola*
- 42b. Leaf midrib and petiole usually green, blades often lanceolate, elliptic, or oblanceolate; twigs of year often glabrous. . . *S. barclayi*

ALPINE ECOLOGICAL ZONE KEY

(Most separations courtesy of Robert Dorn)

- 1a. Plants creeping shrubs 1-8 cm tall, sometimes taller in *S. arctica*
 - 2a. Leaves 7(9) mm or less long, not glaucous; capsules glabrous, usually on limestone. . . *S. rotundifolia*
 - 2b. Leaves mostly over 7 mm long, often glaucous ventrally; capsules pubescent
 - 3a. Leaf tips usually rounded, blade prominently reticulate-veined ventrally, styles less than .5 mm long . . . *S. reticulata*
 - 3b. Leaf tips usually pointed, blades not reticulate-veined; styles .3-2 mm long
 - 4a. Leaves mostly elliptic to oval, glaucous ventrally, old ones usually not persisting; catkins 1-5 cm long; sometimes over 8 cm tall in protected places. . . *S. arctica*
 - 4b. Leaves narrowly elliptic to elliptic, usually green beneath, old ones often persisting; catkins mostly .6-2 cm long. . . *S. cascadiensis*
- 1b. Plants usually erect shrubs over 8 cm tall.
 - 5a. Leaves about equally green on both sides
 - 6a. Plants with mature pistillate catkins
 - 7a. Capsules pubescent. . . *S. barrattiana*
 - 7b. Capsules glabrous. . . *S. tweedyi*
 - 6b. Plants without mature pistillate catkins
 - 8a. Twigs glutinous, staining pressing papers yellow or green. . . *S. barrattiana*
 - 8b. Twigs not glutinous. . . *S. tweedyi*
 - 5b. Leaves obviously lighter ventrally than dorsally
 - 9a. Leaves elliptic-obovate to oval, mostly leathery, dark green dorsally, silvery hairy ventrally (becoming glabrate), some catkins at tips of twigs of the season; rarely low, creeping. . . *S. vestita*
 - 9b. Leaves and catkins not as above
 - 10a. Plants with mature pistillate catkins
 - 11a. Capsules glabrous. . . *S. tweedyi*
 - 11b. Capsules pubescent
 - 12a. Styles 1-2.5 mm long; twigs glutinous; catkins sessile or nearly so, some at the tips of twigs of the previous year. . . *S. barrattiana*
 - 12b. Styles, twigs, and catkins not combined as above
 - 13a. Pistillate catkins coetaneous on leafy floriferous branchlets 2-25 mm long; leaves and twigs often pubescent; rarely low, creeping. . . *S. glauca*
 - 13b. Pistillate catkins precocious or coetaneous, sessile or nearly so or sometimes with floriferous branchlets to 13 mm long; twigs glabrous or pubescent. . . *S. planifolia* var *monica*
 - 10b. Plants without mature pistillate catkins, mature leaves
 - 14a. Twigs glutinous, staining pressing papers yellow or green. . . *S. barrattiana*
 - 14b. Twigs not glutinous
 - 15a. Most leaves entire or nearly so
 - 16a. Leaves glabrous or nearly so. . . *S. planifolia* var *monica*
 - 16b. Leaves usually obviously pubescent, rarely glabrate; rarely low creeping . . . *S. glauca*
 - 15b. Most leaves toothed
 - 17a. Leaves only slightly lighter ventrally, very finely glandularly toothed; twigs with long, spreading pubescence. . . *S. tweedyi*
 - 17b. Leaves glaucous ventrally, often more coarsely toothed; twigs often glabrous or with appressed pubescence. . . *S. planifolia* var *monica*

LAYPERSON'S KEY TO WILLOWS OF THE PLAINS ECOLOGICAL ZONE

- 1a. Trees. Have only one central stem (trunk), at least at the very bottom
- 2a. Twigs hanging down - "weeping"
 - 3a. Twigs brown or olive; very uncommon in the wild, sheltered places only. . . Weeping Willow (*S. babylonica*)
 - 3b. Twigs yellow, or yellow-green, mostly obviously planted, uncommon in the wild. . . Yellow Weeping Willow (*S. alba* var. *tristis*)
- 2b. Twigs pointed up or out
 - 4a. Leaves dull yellow green on top with a white waxy layer beneath, common in the wild at lower elevations in most of Montana along large streams and on floodplains, water deposited soils, native . . . Peachleaf Willow (*S. amygdaloides*)
 - 4b. Leaves shiny dark green on top, light-colored beneath. May or may not have a waxy layer on the bottom, exotic, often obviously planted
 - 5a. Twigs are not weak (brittle), usually does not have glands on the leaves or leaf stalks . . . White Willow (*S. alba*)
 - 5b. Twigs weak, easily broken; leaves and leaf stalks often have glands
 - 6a. Leaves narrow in relation to length, at least 3 times as long as wide. . . Crack Willow (*S. fragilis*)
 - 6b. Leaves wide in relation to length, less than 3 times as long as wide. . . Laurel Willow (*S. pentandra*)
- 1b. Usually shrubs. Have no single main stem, have several to many woody stems
 - 7a. Leaves long and narrow in relation to length - at least 6 times as long as wide. Grows in colonies, not clumps. . . Streambank Willow (*S. exigua*)
 - 7b. Leaves less than 6 times as long as wide. Grows in clumps, not colonies
 - 8a. Leaves the same color on both sides. . . Pacific Willow (*S. lasiandra*)
 - 8b. Leaves lighter in color, different shades of green, green-white, or green-yellow on the bottom side
 - 9a. Leaf stalks have glands near the base of the leaf blade, leaf tips taper to a long point ("acuminate")
 - 10a. Leaves mostly over 4 times as long as wide, stamens more than 2. . . Pacific Willow (*S. lasiandra*)
 - 10b. Leaves mostly less than 4 times as long as wide, stamens 2. . . Autumn Willow (*S. serrisima*)
 - 9b. Leaf stalks have no glands, leaf tips are rounded or quickly end in a sharp tip ("acute")
 - 11a. Older twigs somewhat silver-gray, leaves mostly spear-shaped ("lanceolate") . . . Yellow Willow (*S. lutea*)
 - 11b. Older twigs not silvery-gray at all, leaves not spear-shaped
 - 12a. Leaves usually 5 times or more as long as wide, sharply toothed; very uncommon. . . Meadow Willow (*S. petiolaris*)
 - 12b. Leaves usually less than 5 times or more as long as wide, scalloped ("crenate") . . . Pussy Willow (*S. discolor*)

LAYPERSON'S KEY TO WILLOWS OF THE FOOTHILLS/VALLEY ECOLOGICAL ZONE

- 1a. Trees. Have only one central stem (trunk), at least at the very bottom
 - 2a. Twigs hanging down - "weeping"
 - 3a. Twigs brown or olive; very uncommon in the wild, sheltered places only. . .Weeping Willow (*S. babylonica*)
 - 3b. Twigs yellow or yellow-green, mostly obviously planted, uncommon in the wild. . .Yellow Weeping Willow (*S. alba* var. *tristis*)
 - 2b. Twigs pointed up or out
 - 4a. Leaves dull yellow green on top with a white waxy layer beneath, common in the wild at lower elevations in most of Montana along large streams and on floodplains, water deposited soils, native . . .Peachleaf Willow (*S. amygdaloides*)
 - 4b. Leaves shiny dark green on top, light colored beneath. May or may not have a waxy layer on the bottom, exotic, often obviously planted.
 - 5a. Twigs are not weak (brittle), usually does not have glands on the leaves or leaf stalks. . .White Willow (*S. alba*)
 - 5b. Twigs weak, easily broken; leaves and leaf stalks often have glands
 - 6a. Leaves narrow in relation to length, at least 3 times as long as wide. . .Crack Willow (*S. fragilis*)
 - 6b. Leaves wide in relation to length, less than 3 times as long as wide. . .Laural Willow (*S. pentandra*)
- 1b. Usually shrubs, have no single main stem, have several to many woody stems
 - 7a. Leaves long and narrow in relation to length, at least 6 times as long as wide. Grows in colonies, not clumps. . .Streambank Willow (*S. exigua*)
 - 7b. Leaves less than 6 times as long as wide. Grows in clumps, not colonies
 - 8a. Twigs with a waxy, powdery bluish or purplish secretion, sometimes only apparent behind the buds
 - 9a. Leaves usually hairless on top, catkins .5-2.5 inches long. . .Drummond Willow (*S. drummondiana*)
 - 9b. Leaves usually hairy on both surfaces, catkins 1 inch long or less. . .Geyer Willow (*S. geyeriana*)
 - 8b. Twigs without such a secretion
 - 10a. Leaves about the same color on both sides
 - 11a. Leaves taper to a very long point ("long acuminate"), glands on the leaf stalk near the base of the leaf blade. . .Pacific Willow (*S. lasiandra*)
 - 11b. Leaves do not taper to a very long point and usually have no glands on the stalks . . .One Colored Willow (*S. monochroma*)
 - 10b. Leaves lighter beneath than on top
 - 12a. Leaves very densely soft hairy beneath
 - 13a. Leaves mostly widest at the end farthest from branch, satin sheen beneath; stamens 1. . .Sitka Willow (*S. sitkensis*)
 - 13b. Leaves mostly widest in the middle, no satin sheen beneath, stamens 2 . . .Drummond Willow (*S. drummondiana*)
 - 12b. Leaves may be hairy beneath but not soft, densely hairy.
 - 14a. Leaf stalks usually with glands near the base of the leaf blades, leaf tips long and tapering
 - 15a. Leaves mostly over 4 times as long as wide, catkins appear in spring, stamens more than 2. . .Pacific Willow (*S. lasiandra*)
 - 15b. Leaves mostly less than 4 times as long as wide, catkins appear in summer, stamens 2. . .Autumn Willow (*S. serrisima*)
 - 14b. Leaf stalks usually without glands near the base of the leaf blades. Leaves mostly tapering abruptly to a sharp tip or rounded at the tip, stamens 2
 - 16a. Young twigs usually red-purple with hairs which lay close to them, old twigs with white streaks (cracks). Seed capsules with a sharp beak . . .Bebb Willow (*S. bebbiana*)

- 16b. Twigs, seed capsules not as above
 - 17a. Plants often not in riparian areas, leaves widest toward the tip, last year's bark smells "skunky" when stripped. . .Scouler Willow (*S. scouleriana*)
 - 17b. Plants not as above
 - 18a. Leaf edges mostly without teeth, scallops, etc. . . .Short Fruit Willow (*S. brachycarpa*)
 - 18b. Leaf edges mostly toothed or scalloped
 - 19a. Older twigs somewhat silvery-gray, leaves mostly widest toward the base. . .Yellow Willow (*S. lutea*)
 - 19b. Older twigs not silvery-gray, leaves mostly widest toward the tip or in the middle
 - 20a. Leaves usually 5 times or more as long as wide, sharply toothed. . .Meadow Willow (*S. petiolaris*)
 - 20b. Leaves usually less than 5 times as long as wide, scalloped. . .Pussy Willow (*S. discolor*)

LAYPERSON'S KEY TO WILLOWS OF THE MONTANE ECOLOGICAL ZONE

- 1a. Leaves long and narrow in relation to width, at least 6 times as long as wide; plants form colonies, not clumps
 - 2a. Leaves the same color on both sides. . . Streambank Willow (*S. exigua*)
 - 2b. Leaves usually have a white, waxy layer on the bottom side. . . Mountain Streambank Willow (*S. melanopsis*)
- 1b. Leaves usually (but not always) not long and narrow in relation to width; plants form clumps, not colonies
 - 3a. Twigs with a waxy, powdery bluish or purplish secretion, sometimes only apparent behind the buds
 - 4a. Leaves usually densely silvery hairy beneath, hairless on top; catkins .5-2.5 inches long . . . Drummond Willow (*S. drummondiana*)
 - 4b. Leaves not densely silvery hairy beneath (but do have hair beneath), often hairy on top; catkins 1 inch long or less
 - 5a. Leaves equally green and with long straight hairs which lay close to both sides of the leaves . . . Geyer Willow (*S. geyeriana*)
 - 5b. Leaves with few hairs on top, usually with white, waxy layer beneath. . . Lemmon Willow (*S. lemmonii*)
 - 3b. Twigs without such a secretion
 - 6a. Leaves about the same color on both sides
 - 7a. Leaf tips long and tapering ("acuminate"), leaf stalks have glands near the base of the leaf blades, stamens more than 2, seed capsules have no hair. . . Pacific Willow (*S. lasiandra*)
 - 7b. Leaf tips not long and tapering, no glands on the leaf blades, stamens 2
 - 8a. Leaves wide in relation to their length, very finely toothed; twigs have spreading hairs; small leaf-like structures at the base of the leaf stalks ("stipules"). . . Tweedy Willow (*S. tweedyi*)
 - 8b. Leaves narrow in relation to their length, toothed or not toothed; twigs may or may not be hairy, may or may not have small leaf-like structures at the base of leaf stalks
 - 9a. Plants less than 6 feet high, mature leaves often densely silvery hairy. . . Wolf Willow (*S. wolfii*)
 - 9b. Plants often over 6 feet high, mature leaves sparsely hairy to hairless. . . Booth Willow (*S. boothii*)
 - 6b. Leaves lighter beneath
 - 10a. Leaves either have widest part in the middle or toward the tip, usually very densely white or silvery hairy beneath, hairless or almost hairless above
 - 11a. Leaves white hairy beneath, twigs hairy. . . Hoary Willow (*S. candida*)
 - 11b. Leaves silvery hairy beneath, twigs may or may not be hairy.
 - 12a. Female catkins mounted directly on branch or nearly so (female catkins do not have a stalk), leaves mostly are wider in the middle, stamens 2. . . Drummond Willow (*S. drummondiana*)
 - 12b. Female catkins on leafy stalks; leaves mostly widest toward the tip; have satin sheen beneath; stamens 1. . . Sitka Willow (*S. sitkensis*)
 - 10b. Leaves not as above
 - 13a. Leaf stalks with glands near the base of the leaf blade, leaves have a long, tapering tip ("acuminate"), stamens more than 2. . . Pacific Willow (*S. lasiandra*)
 - 13b. Leaf stalks usually do not have glands near the base of the leaf blade, leaf tips not long and tapering, stamens 2
 - 14a. Young twigs usually red-purple with hairs laying close to them, bark of older twigs cracked, giving a white, streaked appearance. . . Bebb Willow (*S. bebbiana*)
 - 14b. Twigs not as above
 - 15a. Leaves spear-shaped with widest part near tip ("oblanceolate"), fresh stripped bark from last year's twigs smells "skunky", over 6 feet high, mostly upland rather than riparian... . . Scouler Willow (*S. scouleriana*)
 - 15b. Leaves, bark, habitat not as above

- 16a. Leaves not toothed or nearly so
 - 17a. Leaves hairless or nearly so
 - 18a. Leaves mostly 5 times as long as wide. . .Lemmon Willow (*S. lemmonii*)
 - 18b. Leaves mostly less than 5 times as long as wide
 - 19a. Twigs usually shiny and reddish, leaves shiny above. . .Planeleaved Willow (*S. planifolia*)
 - 19b. Twigs mostly dull brownish, greenish, or blackish; leaves dull above. . .Farr Willow (*S. farriar*)
 - 17b. Leaves with thick wooly hair. . .Short Fruited Willow (*S. brachycarpa*)
- 16b. Most leaves toothed
 - 20a. Leaves only slightly lighter beneath, very finely toothed, young twigs with long, spreading hairs. . .Tweedy Willow (*S. tweedyi*)
 - 20b. Leaves have a white, waxy coating beneath; young twigs have no hair or hairs that lay close (do not spread)
 - 21a. Leaves mostly have their widest part in the middle, dark green and shiny above; twigs usually reddish and shiny. . .Planeleaf Willow (*S. planifolia*)
 - 21b. Leaves mostly widest toward the base or the tip; if they are widest in the middle, they usually are not shiny above and the twigs are not reddish and shiny and. . . Serviceberry Willow (*S. pseudomonticola*)

LAYPERSON'S KEY TO THE WILLOWS OF THE SUBALPINE ECOLOGICAL ZONE

- 1a. Plants very small, usually no more than 3.5 inches tall, form a mat
 - 2a. Veins on the underside of leaf prominent and net-like. . .Snow Willow (*S. reticulata*)
 - 2b. Veins on the underside of leaf not prominent and net-like
 - 3a. Leaves mostly shorter than .3 inches, no white, waxy layer beneath, usually on limestone. . .Dodge Willow (*S. rotundifolia*)
 - 3b. Leaves mostly longer than .3 inches, white, waxy layer beneath. . . Arctic Willow (*S. arctica*)
- 1b. Plants more than 3.5 inches tall
 - 4a. Leaves long and narrow in relation to width, at least 6 times as long as wide; plants form colonies, not clumps
 - 5a. Leaves the same color on both sides. . .Streambank Willow (*S. exigua*)
 - 5b. Leaves usually have a white waxy layer on the bottom side. . .Mountain Streambank Willow (*S. melanopsis*)
 - 4b. Leaves usually (but not always) not long and narrow; plants form clumps
 - 6a. Twigs with a waxy, powdery-bluish or purplish secretion, sometimes only apparent behind the buds
 - 7a. Leaves usually densely silvery hairy beneath, hairless on top; catkins .5-2.5 inches long . . .Drummond Willow (*S. drummondiana*)
 - 7b. Leaves not densely silvery hairy beneath (but do have hair beneath); sometimes hairy on top; catkins 1 inch long or less
 - 8a. Leaves equally green and with long straight hairs which lay close to both sides of the leaves. . .Geyer Willow (*S. geyeriana*)
 - 8b. Leaves with few hairs on top, usually with white waxy layer beneath. . .Lemmon Willow (*S. lemmonii*)
 - 6b. Twigs without such a secretion
 - 9a. Leaves about the same color on both sides
 - 10a. Twigs have a sticky or slimy surface which is caused by a sometimes fragrant oil that stains pressing paper yellow or green. . .Barratt Willow (*S. barrattiana*)
 - 10b. Twigs not as above
 - 11a. Leaves very finely toothed, twigs have long spreading hair; usually have small, but well developed, leaf-like structures at the base of leaf stalks ("stipules") . . .Tweedy Willow (*S. tweedyi*)
 - 11b. Leaves and twigs not combined as above, may or may not have small, leaf-like structures at the base of leaf stalks
 - 12a. Young leaves have prominent glands on their edges. . .Eastwood Willow (*S. eastwoodiae*)
 - 12b. Young leaves do not have prominent glands on their edges
 - 13a. Leaves broad in relation to length, often with dense long, loose hair. . .Undergreen Willow (*S. commutata*)
 - 13b. Leaves narrow in relation to their length
 - 14a. Plants mostly less than 6 feet high, mature leaves often densely silvery hairy. . .Wolf Willow (*S. wolfii*)
 - 14b. Plants often over 6 feet high, mature leaves, mostly sparsely hairy or hairless. . .Booth Willow (*S. boothii*)
 - 9b. Leaves lighter beneath
 - 15a. Leaves mostly leathery, dark green above, silvery hairy becoming almost hairless beneath, at least some catkins at the tips of this year's twigs. . .Rock Willow (*S. vestita*)
 - 15b. Leaves and catkins not as above
 - 16a. Leaves narrow with their widest part in the middle, or at the tip usually very densely white or silvery hairy beneath, hairless or slightly hairy above
 - 16b. Leaves not with the combination of features above
 - 17a. Leaves white hairy beneath, twigs hairy. . .Hoary Willow (*S. candida*)
 - 17b. Leaves silver hairy beneath, twigs may or may not be hairy. . .Drummond Willow (*S. drummondiana*)

- 18a. Twigs have a sticky or slimy surface which is caused by a sometimes fragrant oil that stains pressing paper yellow or green . . .Barratt Willow (*S. barrattiana*)
- 18b. Twigs without such a surface
 - 19a. Leaves not toothed or nearly so
 - 20a. Leaves hairless or nearly so
 - 21a. Leaves mostly 5 times as long as wide . . .Lemmon Willow (*S. lemmonii*)
 - 21b. Leaves mostly less than 5 times as long as wide
 - 22a. Twigs usually shiny and reddish; leaves shiny above. . .Planeleafed Willow (*S. planifolia*)
 - 22b. Twigs mostly dull brownish, greenish, or blackish; leaves dull above. . .Farr Willow (*S. farriae*)
 - 19b. Leaves usually hairy
 - 23a. Leaves .6-3 inches long, usually sparsely to moderately hairy, leaf stalks not especially short. . .Gray Willow (*S. glauca*)
 - 23b. Leaves .2-1.3 inches long, usually densely hairy; leaf stalks extremely short, less than .1 inch. . .Short Fruited Willow (*S. brachycarpa*)
 - 20b. Leaves mostly toothed
 - 24a. Leaves only slightly lighter beneath, very finely-toothed, young twigs with long spreading hairs. . .Tweedy Willow (*S. tweedyi*)
 - 24b. Leaves have a white waxy coating beneath; young twigs have no hair or hairs that lay close (do not spread)
 - 25a. Leaves have their widest part in the middle, dark green and shiny above; twigs usually reddish and shiny . . .Planeleaf Willow (*S. planifolia*)
 - 25b. Leaves mostly widest toward the base or the tip; if they are widest in the middle, they usually are not shiny above and the twigs are not reddish and shiny
 - 26a. Leaf midrib and stalk often red, leaf blades usually wide in relation to the length; twigs often hairy. . .Serviceberry Willow (*S. pseudomonticola*)
 - 26b. Leaf midrib usually green, leaf blades usually narrow in relation to the length; this year's twigs often not hairy. . .Barclay Willow (*S. barclayi*)

LAYERPERSON'S KEY TO THE WILLOWS OF THE ALPINE ECOLOGICAL ZONE

- 1a. Plants very small, usually no more than 3.5 inches tall, form an "alpine mat"
 - 2a. Leaves mostly .3 inches or less long, no white waxy layer beneath; seed capsules hairless, usually on limestone. . .Dodge Willow (*S. rotundifolia*)
 - 2b. Leaves mostly more than .3 inches long, often have white waxy layer beneath, seed capsules hairy
 - 3a. Leaf tips rounded, prominently net-veined beneath. . .Snow Willow (*S. reticulata*)
 - 3b. Leaf tips pointed, not prominently veined beneath
 - 4a. Leaves with white waxy layer beneath, old ones usually not persisting, catkins .4-2 inches long, common. . .Arctic Willow (*S. arctica*)
 - 4b. Leaves usually green beneath, old ones often persisting; catkins .2-.5 inches long, rare . . .Cascade Willow (*S. cascadiensis*)
- 1b. Plants larger, more than 3.5 inches tall
 - 5a. Leaves about the same color on both sides
 - 6a. Twigs have a sticky or slimy surface which is caused by a sometimes fragrant oil that stains pressing paper yellow or green, seed capsules hairy, rare. . .Barratt Willow (*S. barrattiana*)
 - 6b. Twigs without such an oil, seed capsules without hair, common. . . Tweedy Willow (*S. tweedyi*)
 - 5b. Leaves lighter colored beneath
 - 7a. Leaves wide in relation to length, mostly leathery, dark green above, silvery hairy becoming almost hairless beneath, at least some catkins at the tops of this year's twigs. . .Rock Willow (*S. vestita*)
 - 7b. Leaves and catkins not as above
 - 8a. Twigs have a sticky or slimy surface which is caused by a sometimes fragrant oil that stains pressing paper yellow or green, rare. . .Barratt Willow (*S. barrattiana*)
 - 8b. Twigs do not have such an oil
 - 9a. Leaves mostly not toothed
 - 10a. Leaves hairless or mostly hairless. . .Planeleaved Willow (*S. planifolia*)
 - 10b. Leaves usually hairy, plants look gray-green from a distance because of this hair. . .Gray Willow (*S. glauca*)
 - 9b. Leaves mostly toothed
 - 11a. Leaves only slightly lighter in color beneath, twigs have long spreading hair . . .Tweedy Willow (*S. tweedyi*)
 - 11b. Leaves have white waxy layer beneath, often hairless or with hair that lays close (does not spread). . .Planeleaved Willow (*S. planifolia*)



Salix L.
Willow
Genus Description

Vegetative Structures

Habit: large tree to prostrate shrub

Leaves:

Shape: very variable, from obovate to linear-lanceolate

Structure: simple

Placement: alternate

Margins: entire to serrate to crenate serrate

Petioles: much shorter than leaf blades, sometimes glandular at summit

Stipules: persistent or deciduous or caducous or absent

Habitat: Plants of wet to moist places, often an important component of riparian areas (both climax and seral).

Remarks: Young growth often more vigorous than old growth. Especially so with stipules, often phreatophytic.

Sexual Structures

Catkins: Erect to pendulous, usually coetaneous, sometimes precocious or serotinous, sometimes subtended by a bract (not to be confused with floral bracts which are herein called scales)

Flowers: Unisexual, subtended by a scale (floral bract) or 1-2 nectar glands or cupular disk

Perianth: absent or vestigial

Stamens: 1 to 12+

Pistils: 1, bicarpellate

Stigmas: 2 to 4 lobed

Styles: well developed to none, 1

Ovary: superior

Fruit: 2 valved capsule



pendantra not done



Salix alba L.
White Willow

Layperson's Tips: Tree, medium to large. Exotic. Leaves dark green and shiny on top, narrow, lighter green on bottom. Twigs may or may not be weeping, not brittle.

General

Synonyms: —

Other common name(s): —

Pronunciation: AL-ba ('a' as in Persia).

Ecological Zone(s): Foothills/Valley, Plains

Habitat: moist areas, natural or irrigated.

Remarks: Several varieties (see Brunsfeld and Johnson, 1985; Great Plains Flora Assn., 1986). Naturalized, escapes cultivation. Several cultivars and hybrids. Introduced from Europe for aspirin (acetylsalicylic acid), gun powder, aesthetics, sentiment, shade in colonial times.

Vegetative Structures

Height: to 30 meters (100 ft.)

Twigs: weeping and yellow to yellow-green in var. *tristis*; ascending, yellow green to golden yellow to orange to dark brown in other varieties; finely appressed pubescent at least on twigs forming in summer.

Mature Leaves:

Dorsal: glabrous, shiny green

Ventral: glabrous to sparsely sericeous, strongly glaucous lighter

Margin: serrate

Length: 4-10 cm

Width: 10-25 mm

Shape: lanceolate to elliptic, acuminate

Stipules: caducous, lanceolate, 2-4 mm long.

Remarks: Leaves often silky pubescent ventrally when young, often asymmetric at tip - at least in var. *vitellina*

Sexual Structures

Catkins, General:

Emergence time: coetaneous

Scale color: pale to yellowish green.

Scale Hair: pubescent

Catkins, staminate:

Length: 3-5 cm

Width: —

Catkins, pistillate:

Length: 3-7 mm

Branchlets: present, leafy

Capsules:

Length: 3.5-5 mm

Stipes: almost absent

Hair: glabrous

Shape: avoid-conic

Styles: .2-.4 mm

Stigmas: —

Stamens: 2

Remarks: Flowers in May.



amygdaloides



Salix amygdaloides Anderss
Peachleaf Willow

Layperson's Tips: Tree, medium to shrub, large. Leaves dull yellow green on top, very thin, almost transparent. Bud scales with free, overlapping margins. Stamens 3-7.

General

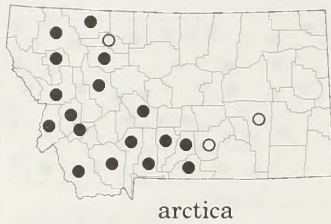
Synonyms: —
Other common name(s): —
Pronunciation: a ('a' as in Persia)
 MIG- dal-oid ('o' as in note) ez ('e' as in mete)
Ecological Zone(s): Foothills/Valley, Plains
Habitat: Along major water courses, flood plains. Alluvial soil.
Remarks: Cheyenne Indians made a tea from the bark for diarrhea. This species is commercially available.

Vegetative Structures

Height: 12 meters (40 ft.), trunk often leaning
Twigs: slender, gray to yellow to reddish to yellow green brown, not brittle, spreading to drooping, more or less glabrous.
Mature Leaves:
Dorsal: glabrous, dull yellow green
Ventral: lighter green, glaucous
Margin: finely serrate, no glands
Length: 3-10 cm (larger on vigorous shoots)
Width: 10-30 mm
Shape: lanceolate to oblanceolate, acuminate
Stipules: usually caducous, minute
Remarks: Bark light brown to yellowish brown

Sexual Structures

Catkins, General:
Emergence time: coetaneous
Scale color: yellowish
Scale Hair: deciduous, villous
Catkins, staminate:
Length: 3-7 cm
Width: 6-10 mm
Catkins, pistillate:
Length: 3-8 cm
Branchlets: present, leafy
Capsules:
Length: 5-7 mm
Stipes: 2 mm long
Hair: glabrous
Shape: ovoid
Styles: .2-.15 mm
Stigmas: bilobed, .2-.5 mm
Stamens: 3-7, usually 5
Remarks: Flowers in May, one gland per flower.



Salix arctica Pallas
Arctic Willow

Layperson's Tips: Shrub, low. Usually no more than 3.5 inches high. High elevations. Leaf wide in relation to length, veins not prominent. Branches trailing.

General

Synonyms:

S. anglorum Cham.
S. torulosa Trautv.
S. crassijulis Trautv.

Other common name(s): Creeping Willow; Alpine Willow

Pronunciation: ar- ('a' as in far) TIC-ca ('a' as in Persia)

Ecological Zone(s): Alpine, subalpine

Habitat: Highly organic soil. Wet places. Meadows, open slopes, stream and lakesides, seeps.

Remarks: Easily confused with *S. reticulata*, common.

Vegetative Structures

Height: to 8 cm (3.5 in.), rarely higher.

Twigs: glabrous to sparsely hairy, yellowish to purplish-black.

Mature Leaves:

Dorsal: glabrous, green

Ventral: often slightly to medium glaucous

Margin: entire to finely serrate

Length: .5-4 cm

Width: 6-25 mm

Shape: elliptic to oval to lanceolate rarely oblanceolate, usually acute.

Stipules: absent or minute.

Remarks: Mat forming above treeline. Occasionally more than 8 cm tall in sheltered places. Its mats are looser than *S. cascadenis* or *S. reticulata*

Sexual Structures

Catkins, General:

Emergence time: coetaneous to serotinous

Scale color: dark brown to black

Scale Hair: long pubescent

Catkins, staminate:

Length: 1-5 cm

Width: -

Catkins, pistillate:

Length: 1-(5)6 cm

Branchlets: present, leafy

Capsules:

Length: 4-8 mm

Stipes: nearly absent

Hair: villous-tomentose

Shape:

Styles: .3-2 mm, reddish to purplish.

Stigmas: bilobed, 1-2.5 mm (including style)

Stamens: 2

Remarks: Usually more than 25 capsules per catkin. 1-2 glads per flower.



babylonica not done

Salix babylonica L.
Weeping Willow

Layperson's Tips: Tree, medium. Exotic. Twigs weeping, dull colored.

General

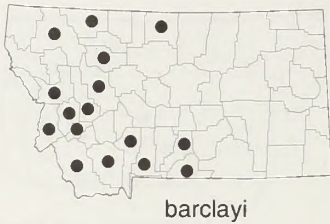
Synonyms: —
Other common name(s): —
Pronunciation: bab-i-LON-i ('i' as in pin) ka ('a' as in Persia)
Ecological Zone(s): Foothills/Valley, Plains.
Habitat: Moist, protected places.
Remarks: Exotic. Planted around habitation (sometimes abandoned) and on ditchbanks. Rarely escapes. Introduced from Europe, native of China (inspired the willow pattern of ceramic dishes). Called *S. babylonica* by L. for the 137th Psalm.

Vegetative Structures

Height: 12 meters (40 ft.)
Twigs: pendulous, almost to the ground, olive or brown.
Mature Leaves:
Dorsal: glabrous, shiny green
Ventral: strongly glaucous, glabrate
Margin: serrate
Length: 8-12 cm
Width: 5-25 mm
Shape: lanceolate to linear, acuminate.
Stipules: caducous
Remarks: Distinguished from *S. alba* var *tristis* by twig color.

Sexual Structures

Catkins, General:
Emergence time: coetaneous
Scale color: pale yellow to green
Scale Hair: pubescent
Catkins, staminate:
Length: 3-6 cm
Width: —
Catkins, pistillate:
Length: 1-6 cm
Branchlets: present, leafy
Capsules:
Length: 3.5-5 mm
Stipes: absent
Hair: glabrous
Shape: ovoid-conic
Styles: nearly obsolete
Stigmas: —
Stamens: 3-5+
Remarks: —



barclayi



5x



Salix barclayi Anderss
Barclay Willow

Layperson's Tips: Shrub, medium to large. High elevations. Leaves lighter beneath, mostly toothed, whitish waxy layer on bottom. Catkin scales hairy.

General

Synonyms: -
Other common name(s): —
Pronunciation: bar ('a' as in fan) kla ('a' as in fate) -I ('i' as in pine)
Ecological Zone(s): Subalpine
Habitat: Along streams in meadows.
Remarks: Hard to distinguish from *S. pseudomonticola*. Uncommon.

Vegetative Structures

Height: 1-4 meters (3-13 ft.)
Twigs: Twigs of the year usually glabrous, sometimes villous, older twigs glabrous; yellowish green becoming dark.
Mature Leaves:
Dorsal: mostly green, midrib pubescent
Ventral: glabrous, glaucous lighter than dorsal.
Margin: mostly finely serrate
Length: 1.5-8 cm
Width: 5-35 mm
Shape: oblanceolate to lanceolate to elliptic, rarely obovate to ovate
Stipules: eventually deciduous
Remarks: See leaf drawing with detailed venation. Leaves early pubescent on both sides, midrib usually green.

Sexual Structures

Catkins, General:
Emergence time: coetaneous to serotinous
Scale color: dark brown to black
Scale Hair: long pubescent
Catkins, staminate:
Length: 1-3 cm
Width: 10-15 mm
Catkins, pistillate:
Length: 1-8 cm
Branchlets: present, leafy, 1-3 cm
Capsules:
Length: —
Stipes: .5 to 1.5 mm long
Hair: glabrous
Shape: —
Styles: .7-2 mm
Stigmas: .3-.5 mm
Stamens: 2
Remarks: —



Salix barrattiana Hook.
Barratt Willow

Layperson's Tips: Shrub, small to medium. High elevations. Leaves usually equally green on both sides. Seed capsules hairy. Twigs sticky or slimy, stains paper yellow or green. Rare.

General

Synonyms: —

Other common name(s): —

Pronunciation: bar- ('a' as in fat) rat ('a' as in fat) TE- ('e' as in mete) ana ('a' as in fate, 'a' as in Persia).

Ecological Zone(s): Alpine, Subalpine

Habitat: Gravelly, wet soil. Often on limestone.

Remarks: Easy to confuse with *S. planifolia*; Considered sensitive in MT by The Nature Conservancy, extremely rare in MT, globally secure.

Vegetative Structures

Height: 3-2 m (1-6 ft.)

Twigs: stout, conspicuously spreading, villous when young; villous, glutinous when mature

Mature Leaves:

Dorsal: villous tomentose, gray green

Ventral: usually but not always the same.

Margin: usually entire

Length: 4-9 cm

Width: 12-55 mm

Shape: broadly elliptic to elliptic-oblongeolate to elliptic-ovate to ovate

Stipules: inconspicuous, caducous

Remarks: Often has a fragrant oil which causes twigs to stain pressing papers yellow or green. Stems and branches blackish.

Sexual Structures

Catkins, General:

Emergence time: precocious to coetaneous

Scale color: blackish

Scale Hair: long pubescent

Catkins, staminate:

Length: 2-4.5 cm

Width: 15 mm

Catkins, pistillate:

Length: 3-9 cm

Branchlets: absent or nearly so.

Capsules:

Length: —

Stipes: —

Hair: villous

Shape: —

Styles: 1-2.5 mm

Stigmas: .3-.5 mm

Stamens: 2, glabrous

Remarks: Some of the pistillate catkins terminate twigs of the previous year.



bebbiana



5x



1x

Salix bebbiana Sarg.
Bebb Willow

Layperson's Tips: Coarse shrub, medium to large, or small tree. Mid elevations. Younger twigs red-purple; older twigs with white streaks (cracks). Seed capsules hairy with sharp beaks.

General

Synonyms: —

S. rostrata Richards

S. perrostrata Rybd.

Other common name(s): Beaked Willow, Diamond Willow

Pronunciation: beb ('e' as in met)- E ('e' as in mete) ana ('a' as in fate, 'a' as in Persia)

Ecological Zone(s): Montane, Foothills/Valley

Habitat: Carrs, marsh borders, meadows, streambanks, other wet places, but not in the wettest sites. Not found on sites that are flooded for long periods of time.

Remarks: Often taller than associated willow species, often on the outer edge of willow thickets. "When the stems are carved they result in a striking pattern of diamond shaped cavities with a sharp contrast between white or cream sapwood and the reddish brown heart wood" (Vierreck and Little). Popular for canes. *S. scouleriana* also has "diamonds."

Vegetative Structures

Height: 1-4 meters (3-13 ft.)

Twigs: Twigs of the year red-purple, rarely grayish brown; appressed pubescent, cracked when older - look white streaked, slender, divaricate, much branched.

Mature Leaves:

Dorsal: pubescent to glabrate, deep green

Ventral: villous or glaucous or glabrous, rugous, lighter green than dorsal.

Margin: usually entire, sometimes serrate

Length: 2.5-8 cm

Width: 10-30 mm

Shape: elliptic to elliptic ovate to oval to oblanceolate

Stipules: usually inconspicuous, deciduous, large on vigorous shoots.

Remarks: Veins prominently raised on the ventral side of leaves. Sometimes treelike to 7 m (23 ft.); bark gray brown, becoming fissured, mature buds with depressed margins.

Sexual Structures

Catkins, General:

Emergence time: precocious to coetaneous.

Scale color: yellowish to light brown, may have reddish tips.

Scale Hair: pilose or villous.

Catkins, staminate:

Length: 1-4 cm

Width: —

Catkins, pistillate:

Length: 1.5-6 cm

Branchlets: to 3 cm long or nearly absent, may be leafy

Capsules:

Length: 5-10 mm

Stipes: 2-5 mm

Hair: finely pubescent

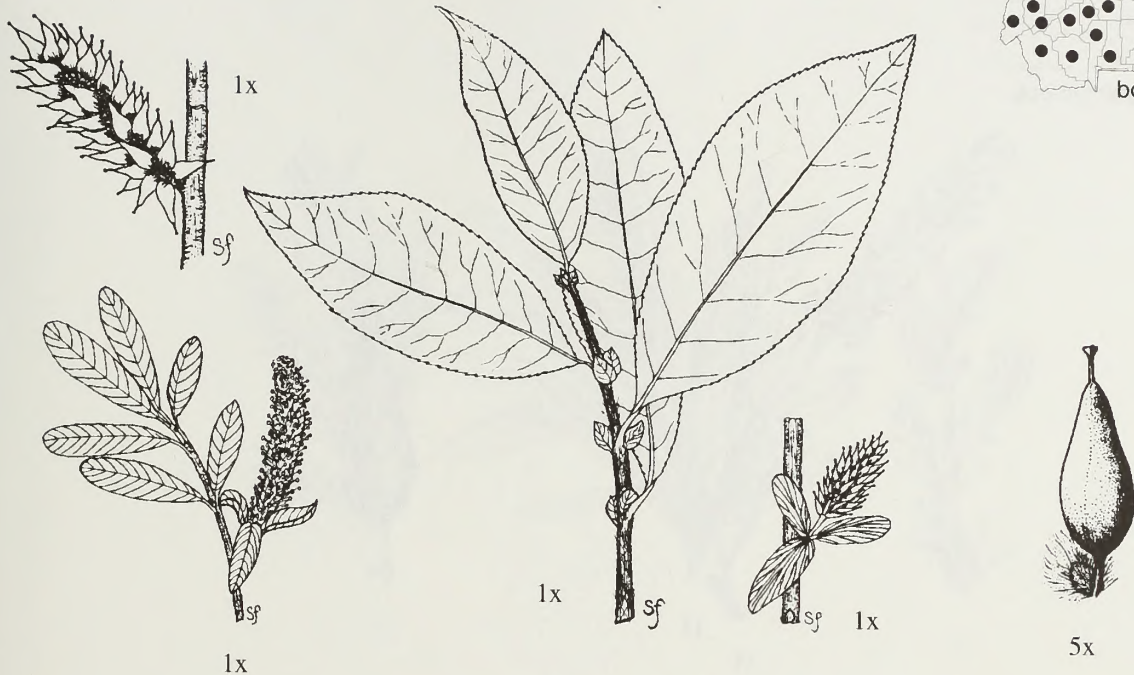
Shape: ovoid to conic, long rostrate

Styles: .1-4 mm

Stigmas: .3-5 mm

Stamens: 2, hairy at base.

Remarks: Flowers in late April to May. One gland on flowers.



***Salix boothii* Dorn**
Booth Willow

Layperson's Tips: Shrub, small to large. Mostly mid elevations, sometimes high. Leaves about equally green on both sides, usually not hairy, no whitish waxy layer on under side.

General

Synonyms: —
S. novae-angliae Andress.
S. pseudocordata Andress.
Other common name(s): Firmleaf Willow, Blueberry Willow
Pronunciation: booth ('oo' as in move) I- ('i' as in pine) -eye
Ecological Zone(s): Subalpine, Montane
Habitat: Deep, fine textured soils. Carrs, swamps, bogs; grows well in dwarf form in bogs.
Remarks: Often associated with *S. drummondiana* and *S. geyeriana*, also associates with *S. bebbiana* and *S. pseudomonticola*. Incorrectly called *S. myrtilifolia* Andress; this is not synonymy. Common.

Vegetative Structures

Height: .2-6 meters (3-20 ft)
Twigs: yellow, orange or brown; pubescent
Mature Leaves:
Dorsal: sparsely pubescent to glabrous, green, sometimes red tinged.
Ventral: same
Margin: serrulate to subentire
Length: 1.5-8.5 cm
Width: 6-25 mm
Shape: narrowly elliptic to lanceolate to oblanceolate, rarely ovate or obovate
Stipules: small, deciduous
Remarks: Stipules on vigorous young shoots are large and foliaceous. Plants usually over 2 m high. Leaves are unique—they are glabrous but not glaucous.

Sexual Structures

Catkins, General:
Emergence time: coetaneous, sometimes precocious
Scale color: black
Scale Hair: densely pubescent, may be glabrous at tip
Catkins, staminate:
Length: 1-2.5 cm
Width: —
Catkins, pistillate:
Length: 1-9 cm, **Branchlets:** present, reduced leaves
Other: glabrous.
Capsules:
Length: 3-6 mm
Stipes: .5-2 mm
Hair: glabrous
Shape: —
Styles: .2-1.5 mm
Stigmas: —
Stamens: 2, glabrous
Remarks: Scales persistent in fruit.



brachycarpa



1x



5x

***Salix brachycarpa* Nutt.**
Short Fruit Willow

Layperson's Tips: Shrub, small to medium. Foothills to high elevations. Leaf stalks very short. Leaves lighter beneath, small.

General

Synonyms: —
S. niphoclada Rydb.
Other common name(s): —
Pronunciation: brak ('a' as in fat) -e ('e' as in mete) CARP- a ('a' as in Persia)
Ecological Zone(s): Subalpine, Montane, Foothills/Valley
Habitat: Carrs, at the edges of wet meadows, not on the wettest sites, parent material often calcareous.
Remarks: Uncommon.

Vegetative Structures

Height: .2-2 meters (.6-6 ft.)
Twigs: yellowish brown to reddish brown to dark red, often grayish tomentose
Mature Leaves:
Dorsal: often villous, tomentose
Ventral: lighter than dorsal, strongly glaucous, often villous, tomentose.
Margin: entire or nearly so
Length: .5-4 cm
Width: 3-15 mm
Shape: obovate to ovate, sometimes elliptic; acute.
Stipules: inconspicuous, deciduous.
Remarks: Forms a tight hemisphere when browsed. Mostly to 1.5 mm (5 ft.) high. Petioles short, to 3 mm long. Leaves may lose their hair at maturity.

Sexual Structures

Catkins, General:
Emergence time: coetaneous
Scale color: greenish to light brown, rarely black.
Scale Hair: pubescent
Catkins, staminate:
Length: .4-2 cm
Width: 5-6 m
Catkins, pistillate:
Length: .5-2 cm, peduncled.
Other: densely pubescent
Capsules:
Length: 3-5 mm
Stipes: less than .5 mm
Hair: densely gray pubescent
Shape: —
Styles: .5-1.5 mm
Stigmas: sometimes cleft.
Stamens: 2
Remarks: Pistillate catkins 10-15 mm wide; catkins numerous, male almost glabrous, dropped later in the season than most willows.



candida



Salix candida Fluegge ex. Willd.
Hoary Willow

Layperson's Tips: Shrub, small to medium. High to mid elevations. Under side of leaves and young twigs have a thick, white coat of hair. Leaves long and narrow, often rolled toward the underside.

General

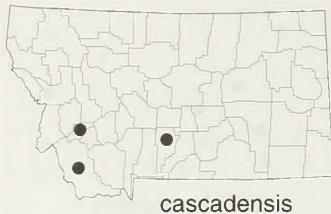
Synonyms: —
Other common name(s): Sageleaf Willow, Silver Willow, Sage Willow.
Pronunciation: KAN-di- ('i' as in pin) da ('a' as in Persia)
Ecological Zone(s): Subalpine, Montane
Habitat: Wet, organic often calcareous or saline soils. Bogs, fens, streambanks.
Remarks: Uncommon.

Vegetative Structures

Height: .5 to 1.5 meters (1½ to 4½ ft.)
Twigs: twigs of the year white tomentose; yellowish or reddish brown, thick.
Mature Leaves:
Dorsal: glabrous, dark green
Ventral: dull white tomentose.
Margin: revolute entire to serrulate to crenate serrate.
Length: 1-5 cm
Width: 3-8 mm
Shape: oblanceolate to oblong, to narrowly elliptic, rarely lanceolate.
Stipules: persistent on vigorous shoots, otherwise caducous, 2-10 mm long,
Remarks: Plants usually less than 1 meter high.

Sexual Structures

Catkins, General:
Emergence time: precocious to coetaneous
Scale color: yellow to brown
Scale Hair: villous
Catkins, staminate:
Length: 1.5-2.5 cm
Width: —
Catkins, pistillate:
Length: 1.5-6 cm
Branchlets: present with small, early deciduous leaves or absent.
Capsules:
Length: 4-8 mm
Stipes: less than 1 mm
Hair: white tomentose
Shape: ovoid
Styles: .8-1.7 mm. Often red.
Stigmas: bilobed .2-.5 mm, often red.
Stamens: 2. Anthers purple.
Remarks: Flowers in May.



cascadensis



5x



1/2x

Salix cascadensis Cockerell
Cascade Willow

Layperson's Tips: Shrub, dwarf—usually no more than 3.5 inches high. High elevations. Leaves narrow in relation to length. Rare.

General

Synonyms: —

Other common name(s): Creeping Willow

Pronunciation: kas-kad ('a' as in fate) DEN-sis

Ecological Zone(s): Alpine

Habitat: Meadows, wet talus slopes and cliffs.

Remarks: Considered sensitive in MT by The Nature Conservancy. Extremely rare in MT, globally secure.

Vegetative Structures

Height: to 8 cm (3.5 in.)

Twigs: —

Mature Leaves:

Dorsal: glabrous, green

Ventral: often glaucous

Margin: entire, sometimes pilose

Length: .5-2.5 cm

Width: 2-8 mm

Shape: narrowly elliptic to elliptic, acute

Stipules: —

Remarks: forms a tight mat above the treeline, old leaves often persist, plant rhizomatous.

Sexual Structures

Catkins, General:

Emergence time: coetaneous.

Scale color: dark brown to black

Scale Hair: long, pubescent longer than scale.

Catkins, staminate:

Length: .6-1.2 cm

Width: —

Catkins, pistillate:

Length: 1-2.5 cm

Branchlets: present

Capsules:

Length: 4-5 mm, **Stipes:** absent

Hair: villous-tomentose

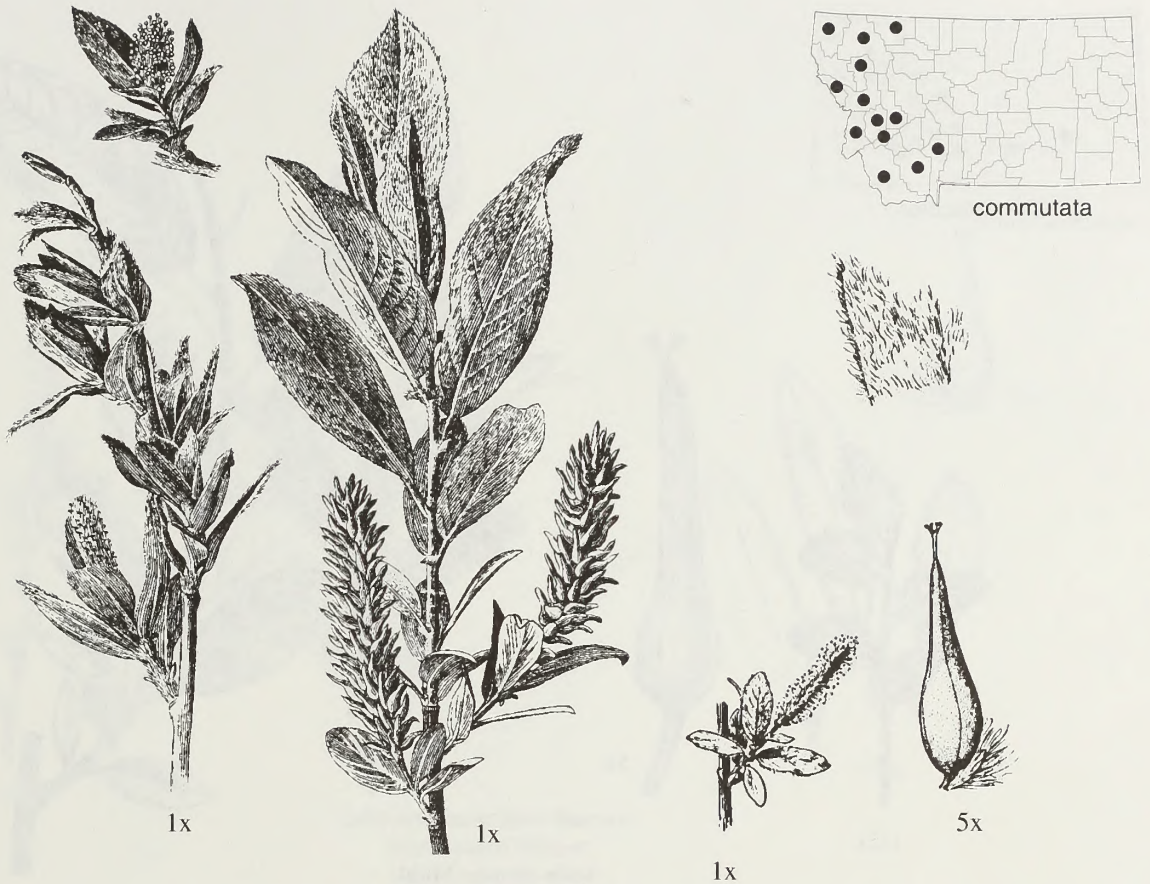
Shape:

Styles: .3-2 mm

Stigmas: bilobed, .2-.5 mm

Stamens: 2

Remarks: Blooms in July, staminate catkins at ends of lateral branches.



Salix commutata Bebb
Undergreen Willow

Layperson's Tips: Shrub, small to medium. High elevations. Leaves broad in relation to length, equally green on both sides.

General

Synonyms: —

Other common name(s): Greenbacked Willow

Pronunciation: kom-MU ('u' as in mute) tat- ('a' as in fate) a ('a' as in Persia)

Ecological Zone(s): Subalpine

Habitat: Peat bogs, often near lakes and streams.

Remarks: Difficult to tell from *S. wolfii* and *S. eastwoodiae*. Very tolerant to flooding and mineral toxicity.

Vegetative Structures

Height: .5-3 meters (1.5-10 ft.)

Twigs: red to brownish under spreading erect pubescence.

Mature Leaves:

Dorsal: long villous, green

Ventral: same

Margin: entire to inconspicuously toothed

Length: 1.5-8 cm

Width: 5-35 mm

Shape: elliptic to elliptic-ovate to obovate

Stipules: often persistent, foliaceous

Remarks: Leaves may eventually be glabrate, usually villous when young.

Plants often under 1 meter tall.

Sexual Structures

Catkins, General:

Emergence time: coetaneous or serotinous.

Scale color: light to dark brown.

Scale Hair: long, woolly villous.

Catkins, staminate:

Length: 1-3 cm

Width: 10 cm

Catkins, pistillate:

Length: 3-9 cm

Branchlets: up to 4 cm long, leafy

Capsules:

Length: 3-6 mm

Stipes: .3-4 mm

Hair: glabrous, rarely sparsely hairy

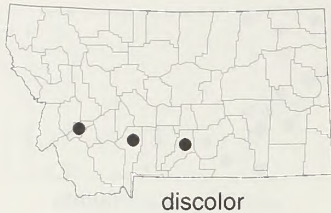
Shape: —

Styles: .5-1.5 mm

Stamens: 2, glabrous

Stigmas: more or less lobed

Remarks: scales persistent in fruit



discolor



1/2x



5x



1/2x



1/2x

Salix discolor Muhl.
Pussy Willow

Layperson's Tips: Coarse, large shrub, small tree.
Low elevations. Leaves lighter beneath. Seed capsules hairy.

General

Synonyms: —

S. prinoides Pursh.

Other common name(s): —

Pronunciation: DIS- kul-er ('e' as in her)

Ecological Zone(s): Foothills/Valley, Plains

Habitat: swamps, fens, streambanks, slough, and ditchbanks.

Remarks: Cultivated for the pistillate catkins ("Pussy Willows")

Vegetative Structures

Height: to 6 meters (20 ft.)

Twigs: stout, reddish to dark brown, glabrous (pubescent when very young)

Mature Leaves:

Dorsal: bright to dark green, glabrous

Ventral: pale glaucous, glabrous

Margin: coarsely crenate, sometimes subentire or serrulate.

Length: 3-10 cm

Width: 10-30 mm

Shape: elliptic to obovate, acute at both ends, sometimes ovate.

Stipules: 3-10 mm long, roundish to semi-ovate

Remarks: see leaf drawing with detailed venation.

Sexual Structures

Catkins, General:

Emergence time: precocious

Scale color: dark brown to reddish brown to black.

Scale Hair: villous

Catkins, staminate:

Length: 1.5 to 5 cm

Width: —

Catkins, pistillate:

Length: 2-12 cm

Branchlets: absent or nearly absent

Capsules:

Length: 5-10 mm

Stipes: 1-2 mm

Hair: finely gray pubescent

Shape: ovoid

Styles: .3-.8+ mm

Stigmas: —

Stamens: 2, hairy toward base.

Remarks: Flowers in April/May. One gland on flowers.



drummondiana



1/2x



1/2x



1/2x

5x

Salix drummondiana Barratt.
Drummond Willow

Layperson's Tips: Shrub, medium to large. Mid to high elevations. Twigs usually have a bluish powdery wax. Leaf lower sides light colored with thick velvety hair.

General

Synonyms: —
Other common name(s): Bluestem Willow
Pronunciation: drum ('u' as in tub) mond-e- ('e' as in mete) ANA ('a' as in fate, 'a' as in Persia)
Ecological Zone(s): Subalpine, Montane, Foothill Valley
Habitat: well drained streambanks and floodplains to carrs, swamps, and wet meadows. Does poorly in bogs.
Remarks: Often associated with *S. geyeriana* and *S. boothii*, may hybridize with *S. sitchensis*, hard to distinguish from *S. lemmonii*, Common. Commercially available.

Vegetative Structures

Height: 1-6 meters (3-20 ft.)
Twigs: usually pruinose, finely pubescent becoming glabrous
Mature Leaves:
Dorsal: glabrate to glabrous, dark green
Ventral: densely, silvery pubescent
Margin: entire, revolute, sometimes obscurely toothed.
Length: 3-9 cm
Width: 3-30 mm
Shape: narrowly elliptic rarely oblanceolate to ovate to lanceolate.
Stipules: narrow, caducous
Remarks: Branches brown to purplish to black, glabrous, usually less than 4 meters tall.

Sexual Structures

Catkins, General:
Emergence time: precocious to coetaneous
Scale color: dark brown to black
Scale Hair: long pubescent
Catkins, staminate:
Length: 1.5-3 cm
Width: 15 mm
Catkins, pistillate:
Length: 1.5-6 cm
Branchlets: absent or nearly absent
Capsules:
Length: 3-6 mm
Stipes: .1-.8 mm
Hair: dense, shortly pubescent
Shape: —
Styles: .4-1.3 mm
Stigmas: .2-.6
Stamens: 2
Remarks: Staminate plants are rare. Pistillate catkins densely flowered; one gland on flowers.

Drawings by David Mattson in "Field Guide to the Willows of East Central Idaho." Permission courtesy of Steven Brunsfeld. Map courtesy of Steve Chadde.



eastwoodii



Salix eastwoodiae Cockerell
Eastwood Willow

Layperson's Tips: Shrub, small to medium. High elevations. Twigs loosely hairy. Leaves toothed with prominent glands.

General

Synonyms: —
Other common name(s): —
Pronunciation: east-wood-e ('e' as in mete) -A ('a' as in fate)
Ecological Zone(s): Subalpine
Habitat: Moist but well drained soils.
Remarks: Difficult to tell from *S. wolfii* and *S. commutata*.

Vegetative Structures

Height: 1-2 meters (3-7 ft.)
Twigs: loosely appressed pubescent, hairs curly or wavy.
Mature Leaves:
Dorsal: densely pubescent, gray to silver.
Ventral: same
Margin: gland toothed, prominently glandular when young.
Length: 1-7 cm
Width: 5-20 mm
Shape: elliptic to oblanceolate
Stipules: 1.5-8 mm, sooner or later deciduous.
Remarks: Leaves get less pubescent with advancing maturity.

Sexual Structures

Catkins, General:
Emergence time: precocious to coetaneous.
Scale color: dark brown to black.
Scale Hair: long, wavy.
Catkins, staminate:
Length: 1-5 cm
Width: —
Catkins, pistillate:
Length: 1-5 cm
Branchlets: present, leafy
Capsules:
Length: —
Stipes:
Hair: densely hairy to glabrous.
Styles: .2-1.9 mm
Stigmas: —
Stamens:
Remarks: —



Salix exigua Nutt.
Streambank Willow

Layperson's Tips: Shrub, medium to large. Sometimes small tree. Forms colonies, not clumps. Low to mid elevations, sometimes high elevations. Leaves 6 times or more as long as wide, green on both sides.

General

Synonyms:

S. interior Rowlee
S. wheeleri (Rowlee) Rybd.
S. linearifolia Rybd.

Other common name(s): Sandbar Willow, Dusky Willow, Coyote Willow, Slender Willow

Pronunciation: EK-ig ('i' as in pin) -ua ('u' as in mute, 'a' as in Persia)

Ecological Zone(s): Subalpine, Montane, Foothills/Valley, Plains

Habitat: Along streams and ditches, on alluvial bars, other wet places.

Remarks: Often early seral. Very variable, several subspecies and varieties.

Taxonomic confusion with *S. melanopsis*. The two species overlap. Colonies often large. Obligate wetland. See Appendix C.

Vegetative Structures

Height: 1.4 to 8 meters (5-26 ft.)

Twigs: glabrous, light yellow to orange to red brown or brown. Older twigs usually have the outer transparent surface flaking off.

Mature Leaves:

Dorsal: glabrous or pubescent, silvery or gray green to yellow green.

Ventral: same or paler color

Margin: entire or finely toothed.

Length: 3-15 cm

Width: 4-20 mm

Shape: lance linear to narrowly elliptic to lance-elliptic.

Stipules: minute or absent

Remarks: These criteria can vary, rhizomatous, seldom higher than 4 meters (13 ft.).

Sexual Structures

Catkins, General:

Emergence time: coetaneous to serotinous.

Scale color: yellowish

Scale Hair: more or less villous.

Catkins, staminate:

Length: 1.5-6 cm

Width: —

Catkins, pistillate:

Length: 1.5-8 cm

Branchlets: present

Capsules:

Length: 4-8 mm

Stipes: to 1.5 mm

Hair: glabrous to pubescent

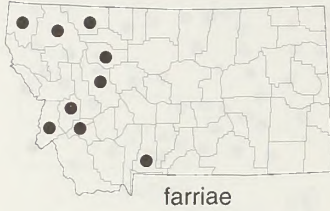
Shape: ovoid

Styles: .2 mm or less

Stigmas: bilobed

Stamens: 2; anthers yellow, hairy at base.

Remarks: Flowers in May to June. This is the same drawing as for *S. melanopsis*, except for the pubescent pistil. Scales fall soon after blooming. One or two glands per flower, sometimes produces catkins in late summer.



Salix farriae Ball
Farr Willow

Layperson's Tips: Shrub, usually small. Mid to high elevations. Leaves hairless, not toothed, have white, waxy layer beneath, lighter in color beneath.

General

Synonyms: —
Other common name(s): —
Pronunciation: far ('a' as in far) E- ('e' as in mete) a ('a' as in fate)
Ecological Zone(s): Subalpine, Montane
Habitat: Wetter parts of meadows.
Remarks: Common in the Pintlar and Sapphire Ranges; otherwise uncommon. Obligate wetland.

Vegetative Structures

Height: .2-2 meters (.5-6.5 ft.)
Twigs: finely pubescent becoming glabrous, dull brownish, greenish or blackish older are dull brown to reddish.
Mature Leaves:
Dorsal: glabrous, dull, yellow-green
Ventral: usually glaucous, pale
Margin: entire or obscurely toothed.
Length: 3-6 cm
Width: 10-20 mm
Shape: elliptic to elliptic-ovate, rarely lanceolate
Stipules: small, deciduous
Remarks: Usually 1 meter or less tall.

Sexual Structures

Catkins, General:
Emergence time: coetaneous to serotinous
Scale color: dark brown to black
Scale Hair: thinly long pubescent to glabrous.
Catkins, staminate:
Length: 1-2 cm
Width: slender
Catkins, pistillate:
Length: 1-3 cm
Branchlets: present, leafy
Capsules:
Length: 4-6 mm
Stipes: .3 to 2 mm
Hair: glabrous
Shape: ovoid
Styles: .4-.7 mm
Stigmas: more or less bilobed
Stamens: 2
Remarks: Scales sometimes have a yellow base.



Salix fragilis L.
Crack Willow

Layperson's Tips: Tree, medium. Exotic. Twigs break very easily. Leaves narrow in relation to width.

General

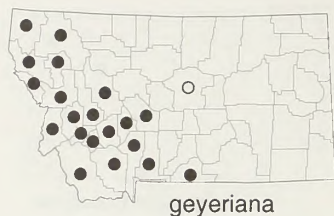
Synonyms: —
Other common name(s): Brittle Willow
Pronunciation: FRAJ-i ('i' as in pin) - lis
Ecological Zone(s): Foothills/Valley, Plains
Habitat: Wet places, natural or irrigated.
Remarks: Naturalized exotic. Planted along water courses and at habitation (often abandoned). Escapes. Introduced from Europe in colonial times for shade, sentiment, ornament, and gunpowder.

Vegetative Structures

Height: to 20 meters (to 65 ft.)
Twigs: spreading, green to olive to yellowing brown to reddish brown, glabrous, brittle at base.
Mature Leaves:
Dorsal: glabrous, shiny dark green, sometimes shiny yellow green.
Ventral: usually glaucous, glabrous
Margin: coarsely glandular serrate
Length: 6-13 cm
Width: 10-35 mm
Shape: lanceolate, to narrowly elliptic, acuminate; often asymmetric
Stipules: well developed but caducous
Remarks: Hybridizes with *S. babylonica* and *S. alba*, causing identification problems

Sexual Structures

Catkins, General:
Emergence time: coetaneous
Scale color: yellowish
Scale Hair: pubescent, villous at tip
Catkins, staminate:
Length: 4-8 cm
Width: —
Catkins, pistillate:
Length: 3-8 cm
Branchlets: —
Capsules:
Length: 3-8 cm
Stipes: .5-1 mm
Hair: glabrous
Shape: narrowly conic
Styles: .2-.7 mm
Stigmas: —
Stamens: 2
Remarks: Flowers in May



geyeriana



Salix geyeriana Anderss.
Geyer Willow

Layperson's Tips: Shrub, relatively small to large. Low to high elevations. Twigs usually have a bluish, powdery wax. Leaves are equally green on both sides. Catkins are loosely flowered.

General

Synonyms: —
Other common name(s): Bluestem Willow
Pronunciation: gey-er-e ('e' as in mete) -ANA ('a' as in fate, 'a' as in Persia)
Ecological Zone(s): Subalpine, Montane, Foothills/Valley
Habitat: Well drained streambanks and floodplains to carrs, swamps, and wet meadows. Does poorly in bogs.
Remarks: Often associated with *S. drummondiana* and *S. boothii*, easy to confuse with *S. lemmonii*. Common. Commercially available.

Vegetative Structures

Height: 1.4-7 meters (5-23 ft.)
Twigs: slender, reddish brown to blackish, twigs of the year are late pruinose, twigs of the previous year are usually pruinose.
Mature Leaves:
Dorsal: green, sericeous
Ventral: same
Margin: entire
Length: 3-8 cm
Width: 4-15 mm
Shape: elliptic to lance-elliptic to lanceolate, shortly acuminate.
Stipules: minute, caducous
Remarks: Leaves with small tooth at apex at least sometimes

Sexual Structures

Catkins, General:
Emergence time: coetaneous
Scale color: tan to brown, rarely red to yellowish to black
Scale Hair: villous to puberulent
Catkins, staminate:
Length: .8-2.0(2.5) cm
Width: —
Catkins, pistillate:
Length: 1-2.5 cm
Branchlets: present, leafy
Capsules:
Length: 3-6 mm
Stipes: 1-3 mm
Hair: thin, shortly pubescent
Shape: —
Styles: .1-.4 mm, stout
Stigmas: bilobed, .2-.4 mm
Stamens: 2
Remarks: Pistillate catkins loosely flowered.



glauca

1x

5x

Salix glauca L.
Gray Willow

Layperson's Tips: Shrub, usually small sometimes medium. Mid to high elevations. Leaves lighter beneath, not toothed. Foliage looks gray-green when seen from a distance.

General

Synonyms: *S. glaucops* Andress.

S. cordifolia Pursh.

S. desertorum Richards

Other common name(s): Grayleaf

Willow

Pronunciation: GLA- ('a' as in fall) ka ('a' as in Persia)

Ecological Zone(s): Subalpine, Alpine

Habitat: Various moist sites, often grows in shade.

Remarks: Locally common.

Vegetative Structures

Height: .3-4 meters (1-13 ft.)

Twigs: dark or reddish, twigs of the year villous-tomentose

Mature Leaves:

Dorsal: villous-tomentose becoming glabrate

Ventral: same, but lighter in color

Margin: entire

Length: 1.5-7 cm

Width: 8-20 mm

Shape: narrowly elliptic to obovate

Stipules: usually small, deciduous

Remarks: Leaf hairs change with age, petioles (2)3 mm long.

Sexual Structures

Catkins, General:

Emergence time: coetaneous

Scale color: yellowish brown to dark brown to black.

Scale Hair: pubescent

Catkins, staminate:

Length: 1.2-3 cm

Width: —

Catkins, pistillate:

Length: 1.5-5 cm

Branchlets: .5-2.5 cm, leafy

Capsules:

Length: 4-8 mm

Stipes: 0-1.5 mm

Hair: white pubescent

Shape: —

Styles: .4-.8 mm

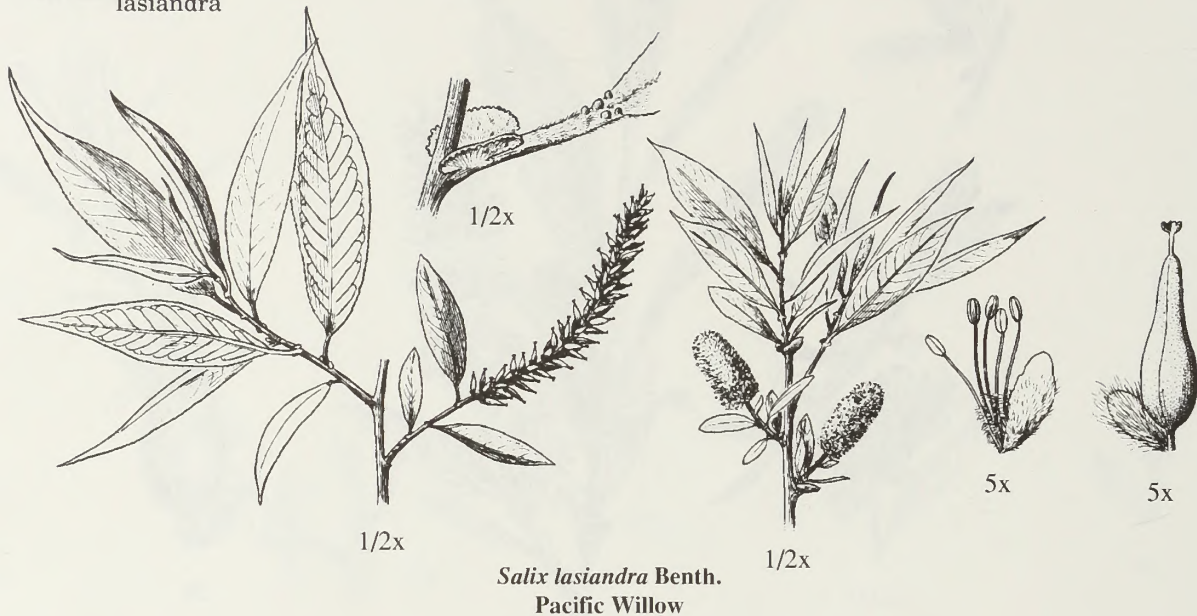
Stigmas: bilobed, shorter than style

Stamens: 2

Remarks: one gland per pistillate flower.



lasiandra



Salix lasiandra Benth.
Pacific Willow

Layperson's Tips: Coarse shrub, usually large, or small tree. Low to mid elevations. Leaves shiny green, tapering to a long point. Usually two glands at the base of the leaf blade (see drawing). Stamens more than 2.

General

Synonyms: —

Other common name(s): Whiplash Willow, Black Willow, Yellow Willow

Pronunciation: la- ('a' as in fate) se- ('e' as in mete) ANDRA ('a' as in fat, 'a' as in Persia)

Ecological Zone(s): Montane, Foothills/Valley, Plains

Habitat: Swamps, moist alluvial bottom lands, well drained streambanks, ditchbanks.

Remarks: Often found in early seral stages.

Vegetative Structures

Height: 2-15 meters (6-50 ft.)

Twigs: moderately to densely pubescent, become glabrous with age, yellow to reddish brown

Mature Leaves:

Dorsal: finely pubescent, becoming glabrous, shiny green.

Ventral: same or glaucous.

Margin: very finely serrate

Length: 4-15 cm

Width: 8-30 mm

Shape: narrowly elliptic to lanceolate, long, acuminate

Stipules: well developed, foliaceous, kidney shaped, sooner or later deciduous

Remarks: Two or more large glands on petiole at base of leaf blade rarely higher than 6 meters (20 ft.)

Sexual Structures

Catkins, General:

Emergence time: coetaneous

Scale color: yellow, sometimes green or whitish

Scale Hair: pubescent

Catkins, staminate:

Length: 2-7 cm, stout

Width: 15 mm

Catkins, pistillate:

Length: 2-12 cm

Branchlets: present, small leafy

Capsules:

Length: 4-7 mm

Stipes: 1-2.5 mm

Hair: glabrous

Shape: —

Styles: .5-1 mm

Stigmas: .5 mm, blunt

Stamens: 3-8

Remarks: Normally has 5 stamens, scales deciduous soon after bloom. Two glands per flower.



lemmonii not done



Salix lemmonii Bebb.
Lemmon Willow

Layperson's Tips: Shrub, small to medium. Mid to high elevations. Twigs usually have a bluish powdery wax. Leaves are lighter colored, waxy, and only finely hairy beneath.

General

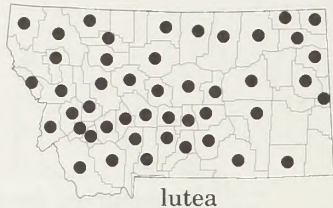
Synonyms:
Other Common Names: —
Pronunciation: lem-MON ('o' as in note) -e ('e' as in mete) -i ('i' as in pine)
Ecological Zone(s): Subalpine, Montane
Habitat: Well drained streambanks and floodplains to wet shrub basins. Does poorly in bogs.
Remarks: May not be in Montana, no map available, very similar to and hard to distinguish from *S. geyeriana* and *S. drummondiana*, often higher elevation than *S. geyeriana*.

Vegetative Structures

Height: 1-3 meters (3-10 ft.)
Twigs: Usually white pruinose, glabrous to sparsely pubescent, becoming strongly glaucous, chestnut red to purplish red.
Mature Leaves:
Dorsal: shiny green, glabrous to very finely pubescent
Ventral: pale glaucous, glabrous to finely pubescent
Margin: Entire to serrulate
Length: 3-8 cm
Width: 6-15 mm
Shape: lance-elliptic
Stipules: minute, inconspicuous
Remarks: Leaves slightly appressed reddish hairy when unfolding, soon mostly glabrous; numerous slender, crooked stems; loose basal cluster

Sexual Structures

Catkins, General:
Emergence time: precocious to coetaneous
Scale color: brown to black
Scale Hair: long pubescent
Catkins, staminate:
Length: .8-2.5 cm
Width: —
Catkins, pistillate:
Length: .8-2.5 cm
Branchlets: present, leafy, to 1 cm rarely absent
Capsules:
Length: to 7 mm
Stipes: .5-2 mm
Hair: pubescent
Shape: —
Styles: .2-.7 mm
Stigmas: less than .5 mm long
Stamens: 2
Remarks: —



lutea



1/2x

Salix lutea Nutt.
Yellow Willow



5x

1/2x

1/2x

Layperson's Tips: Tree, small to shrub, large to medium. Low elevations. Leaves have no hair and are whitish-waxy beneath. Twigs are yellowish turning gray with age.

General

Synonyms:

S. cordata Muhl.
S. rigida Muhl.

Other common name(s): Mackenzie Willow

Pronunciation: LU- ('u' as in mute) te ('e' as in mete) a ('a' as in Persia)

Ecological Zone(s): Foothills/Valley, Plains

Habitat: Well drained stream and ditchbanks, swamps.

Remarks: Called *S. rigida* var. *watsonii* (Bebb) Cronq; this is a misapplied name, not synonymy. (see Appendix C). Common. Commercially available. Very similar to *S. monochroma* - Note that the same drawing was used.

Vegetative Structures

Height: 3-8 meters (10-26 ft.)

Twigs: young are usually distinctly yellowish, older are somewhat silvery gray

Mature Leaves:

Dorsal: glabrous, dark green to yellow green

Ventral: pale, usually glaucous

Margin: mostly serrate, sometimes serrulate to entire

Length: 3-12 cm

Width: 10-40 mm

Shape: lanceolate, rarely oblanceolate, or broadly elliptic, acuminate

Stipules: well developed, foliaceous, sooner or later deciduous

Remarks: Bark yellowish gray; branches yellow or brown, glabrous or thinly pubescent; Leaves often have hair on dorsal midrib.

Sexual Structures

Catkins, General:

Emergence time: precocious to coetaneous

Scale color: black to blackish red, rarely light brown

Scale Hair: pubescent

Catkins, staminate:

Length: up to 5 cm

Width: —

Catkins, pistillate:

Length: 2-8 cm

Branchlets: present, have 2-3 leaves.

Capsules:

Length: 4-7 mm

Stipes: 1-4 mm

Hair: glabrous

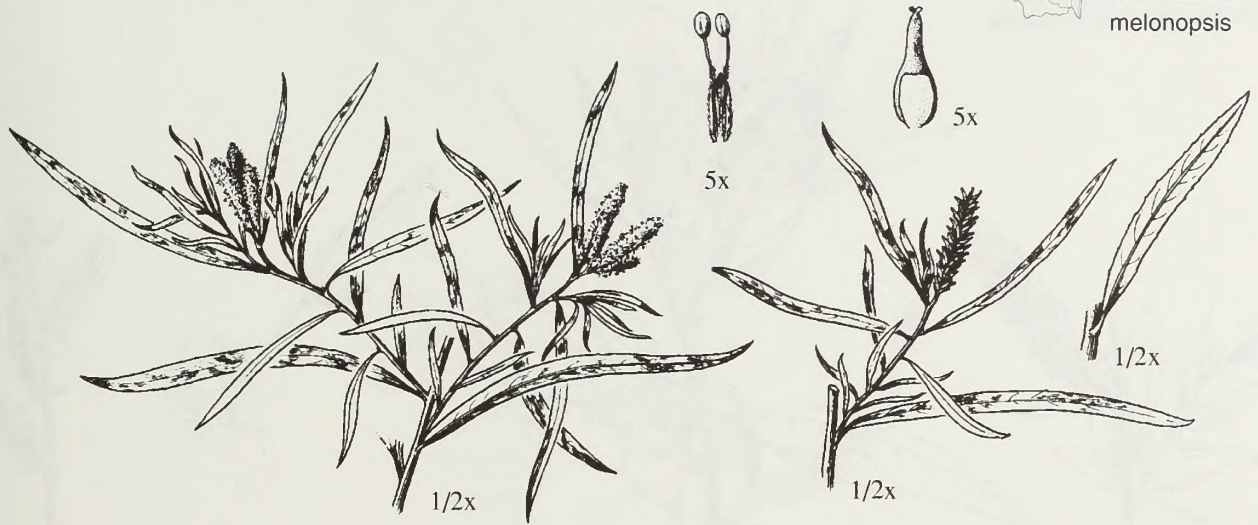
Shape: ovoid

Styles: .3-.7 mm

Stigmas: 2 lobed

Stamens: 2, glabrous, filaments joined at bottom.

Remarks: Flowers in April to early May. Catkin axes sometimes have hairs which hide the scales.



Salix melanopsis Nutt
(Mountain) Streambank Willow

Layperson's Tips: Shrubs, medium to large. Mid to high elevations. Forms colonies, not clumps. Leaves six times or more as long as wide, have white waxy lower sides.

General

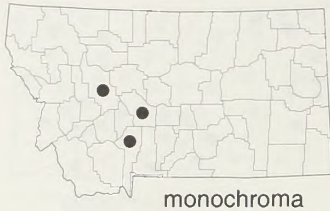
Synonyms: —
Other common name(s): Sandbar Willow, Dusky Willow, Coyote Willow, Slender Willow
Pronunciation: mel ('e' as in mete) an-op ('o' as in note) -SIS
Ecological Zone(s): Subalpine, Montane
Habitat: Along mountain streams.
Remarks: Much taxonomic confusion with *S. exigua*. The species overlap. See Appendix C. Colonies often large. Obligate wetland.

Vegetative Structures

Height: 1.5-8 meters (5-25 ft.)
Twigs: glabrous, red or brown; older twigs usually have the outer transparent layer of flaking off.
Mature Leaves:
Dorsal: green
Ventral: glaucous, or glaucescent, glabrous when expanded
Margin: somewhat toothed
Length: 3-6 cm
Width: 5-15 mm
Shape: linear to narrowly elliptic
Stipules: minute to glabrous
Remarks: Rhizomatous.

Sexual Structures

Catkins, General:
Emergence time: coetaneous to serotinous
Scale color: yellowish
Scale Hair: completely glabrous to pubescent at base
Catkins, staminate:
Length: 1.5-6 cm
Width: —
Catkins, pistillate:
Length: 1.5-8 cm
Branchlets: present
Capsules:
Length: 4-8 mm
Stipes: .5-1.5 mm
Hair: glabrous
Shape: ovoid
Styles: .5-1 mm
Stigmas: bilobed
Stamens: 2, hairy at base.
Remarks: Note glabrous pistil in the drawing—otherwise the drawing is the same as for *S. exigua*. May produce catkins in late summer.



monochroma



***Salix monochroma* Ball**
One Colored Willow

Layperson's Tips: Coarse shrub, medium to large. Low elevations. Leaves the same color on both sides. Leaves taper quickly to a sharp point. No glands on leaf stalks.

General

Synonyms:
Other common name(s): MacKenzie Willow
Pronunciation: MONO- chrom-a ('a' as in Persia)
Ecological Zone(s): Foothills/Valley
Habitat: Wet meadows, streams, ditchbanks.
Remarks: See Appendix C. Very similar to *S. lutea*. Note that the same drawing was used.

Vegetative Structures

Height: 1-9 meters (3-30 ft.)
Twigs: reddish-brown, not yellow
Mature Leaves:
Dorsal: green, usually glabrous
Ventral: same
Margin: finely toothed
Length: 5-15 cm
Width: 10-30 mm
Shape: lanceolate to elliptic, acuminate but not long acuminate
Stipules: to 10 mm, foliaceous, inconspicuous on older branches
Remarks: Leaves thin, somewhat translucent

Sexual Structures

Catkins, General:
Emergence time: precocious to coetaneous
Scale color: dark brown to blackish
Scale Hair: glabrous, axis wooly
Catkins, staminate:
Length: up to 5 cm
Width: 10-15 mm
Catkins, pistillate:
Length: 3-9 cm
Branchlets: present, have 2-3 usually much reduced leaves
Capsules:
Length: 3-7 mm
Stipes: 1.5-4 mm
Hair: glabrous
Shape: —
Styles: .2-.7 mm
Stigmas: often scarcely bilobed
Stamens: 2
Remarks: scales persistent in fruit



pendantra not done



1/2x

Salix pentandra L.
Laurel Willow

Layperson's Tips: Medium tree. Exotic. Leaves thick, leathery, and wide in relation to their length. Twigs brittle at base. Stamens more than two.

General

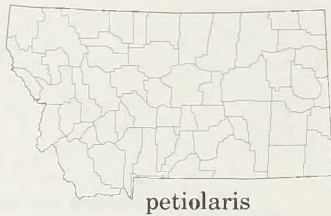
Synonyms: —
Other Common Names: —
Pronunciation: PEN- den-tra ('a' as in Persia)
Ecological Zone(s): Plains, Foothills/Valley
Habitat: Marsh borders, stream and ditch banks.
Remarks: Exotic, occasionally escapes.

Vegetative Structures

Height: to 20 m (66 ft.)
Twigs: Yellowish green, shiny; usually brittle at base.
Mature Leaves:
Dorsal: dark green, shiny
Ventral: dull light green
Margin: finely glandular serrate
Length: 3.5-10 cm
Width: 15 to 40 mm
Shape: broadly lanceolate to ovate, acute to short acuminate.
Stipules: Deciduous, glandular dentate
Remarks: Leaves thick and leathery, petioles strongly glandular at summit.

Sexual Structures

Catkins, General:
Emergence time: serotinous
Scale color: yellowish
Scale Hair: pubescent
Catkins, staminate:
Length: 2-5 cm
Width: —
Catkins, pistillate:
Length: 2-6 cm
Branchlets: present, leafy
Capsules:
Length: 4-5 mm
Stipes: less than 1 mm
Hair: glabrous
Shape: ovoid or conic
Styles: less than .8 mm
Stigmas: —
Stamens: 4-12, usually 5
Remarks: Scales caducous. Blooms in late May, early June.



petiolaris



Salix petiolaris J.E. Sm.
Meadow Willow

Layperson's Tips: Coarse shrub, medium to large, or tree small. Low elevations. Leaves long and narrow, but usually not 6 times as long as wide. Forms clumps or few stemmed shrubs, not colonies.

General

Synonyms: —

S. gracilis Anderss. Rybd.

Other common name(s): Basket Willow

Pronunciation: pet-e- ('e' as in mete)

o- ('o' as note) LAR ('a' as in fare) is

Ecological Zone(s): Plains, Foothill/Valley

Habitat: Carrs, wet meadows, stream and ditchbanks.

Remarks: Reported in Montana, but apparently not confirmed.

Vegetative Structures

Height: 1-7 meters (3-23 ft.)

Twigs: slender, puberulent may become glabrous, yellowish to dark brown or reddish brown

Mature Leaves:

Dorsal: pubescent becoming glabrous, dark green

Ventral: white glaucous

Margin: usually sharply serrate, rarely entire,

Length: 1.5-15 cm

Width: 8-30 mm

Shape: oblanceolate, elliptic, ovate rarely narrowly lanceolate, acute to acuminate

Stipules: absent

Remarks: leaf hairs lost with age.

Probably no more than 3 meters (10 ft.) tall most of the time.

Sexual Structures

Catkins, General:

Emergence time: coetaneous

Scale color: brown

Scale Hair: villous

Catkins, staminate:

Length: 1-5 cm

Width: 2-2.5 cm

Catkins, pistillate:

Length: 1-5 cm, sessile or short

Branchlets: present, leafy

Capsules:

Length: 5-7 mm

Stipes: 1-3 mm

Hair: pubescent

Shape: conic or lanceolate-rostrate

Styles: .1-.3 mm, entire or divided

Stigmas: —

Stamens: 2

Remarks: Flowers in May



Salix planifolia Pursh
Planeleafed Willow

Layperson's Tips: Shrub, small at high elevations; medium to large at mid to high elevations. Leaves are dark and glossy above, paler below, veins approach being parallel.

General

Synonyms:

S. pulchra Cham.

Other common name(s): Tealeaf Willow, Diamondleaf Willow

Pronunciation: PLAN- i- ('i' as in pin) fol- ('o' as in note) ia ('i' as in pine, 'a' as in Persia)

Ecological Zone(s): var. *monica*-Alpine, Subalpine; var. *planifolia*-Subalpine, Montane

Habitat: Streambanks, meadows, moist hillsides.

Remarks: Var. *monica* (Bebb) Jeps. is a low shrub, obligate wetland; - Var. *planifolia* Pursh is a medium shrub to shrubby tree, facultative wetland; forms dense thickets; common in the Beartooths, misnamed *S. phylicifolia* L., this is **not** synonymy. Easily confused with *S. barrattiana*.

Vegetative Structures

Height: .4-1 meter (1-3 ft.) var. *monica*,

2-4 meters (6-13 ft.) var. *planifolia*

Twigs: shiny, reddish to purplish to chestnut, divaricate, puberulent to glabrous, rarely slightly pruinose

Mature Leaves:

Dorsal: initially pubescent, then glabrous, dark green and shiny

Ventral: glaucous, paler than dorsal

Margin: mostly entire, sometimes serrate

Length: 3-8 cm

Width: 12-35 mm

Shape: mostly elliptic, sometimes oblanceolate to lanceolate to oval to obovate; acute.

Stipules: minute, deciduous

Remarks: Var. *monica* leaves often broader than those of Var. *planifolia*, leaves have evident, almost parallel veins

Sexual Structures

Catkins, General:

Emergence time: precocious to coetaneous

Scale color: black at least on the upper half.

Scale Hair: villous

Catkins, staminate:

Length: 1-4 cm

Width: —

Catkins, pistillate:

Length: 1.5-6 cm

Branchlets: short to 1.3 cm, have reduced leaves

Capsules:

Length: 4-8 mm

Stipes: less than 1 mm

Hair: pubescent

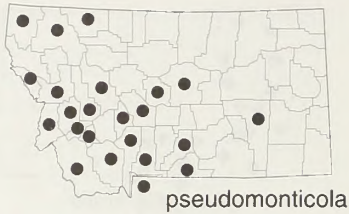
Shape: ovoid, rostrate, long necked

Styles: .4-1.5 mm, entire

Stigmas: .3-.7 mm

Stamens: 2; glabrous

Remarks: Flowers in May.



Salix pseudomonticola C.R. Ball
Serviceberry Willow

Layperson's Tips: Shrub, medium to large. Mid to high elevations. Leaves have white waxy undersides, dull on top, hairless, toothed; twigs hairless, often have red on them. Small, leaflike structures at the base of mature leaf stalks (stipules).

General

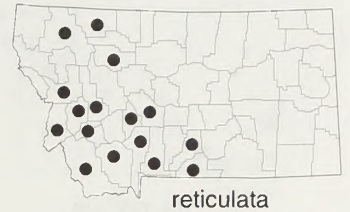
Synonyms: *S. monticola* Bebb.
Other common name(s): Mountain Willow, False Mountain Willow
Pronunciation: so- ('o' as in move) do- ('o' as in note) MON- tic- ('i' as in pin) ola ('o' as in note, 'a' as in Persia)
Ecological Zone(s): Subalpine, Montane
Habitat: Along streams, swamps, wet meadows, carrs. Sometimes in canyon mouths.
Remarks: Hard to distinguish from *S. barclayi*. Locally common.

Vegetative Structures

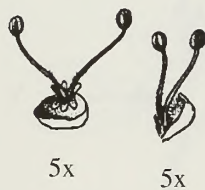
Height: 1.5-6 meters (5-20 ft.)
Twigs: twigs of the year pubescent, brown to yellowish to reddish, second year dark red, pubescent to glabrous
Mature Leaves:
Dorsal: becoming glabrous, dull green
Ventral: lighter than dorsal, glaucous
Margin: irregularly glandular, crenate serrate, rarely entire
Length: 3-8 cm
Width: 12-35 mm
Shape: lanceolate to ovate to obovate to elliptic, acute
Stipules: persistent, ovate, 5-15 mm long
Remarks: Leaves red tipped when expanding, strongly veined; leaf mid-rib, petioles often red; dorsal midveins persistently pubescent.

Sexual Structures

Catkins, General:
Emergence time: precocious, sometime coetaneous
Scale color: dark brown to black, sometimes bicolored.
Scale Hair: long villous
Catkins, staminate:
Length: 2-7 cm
Width: —
Catkins, pistillate:
Length: 1-9 cm
Branchlets: usually absent, sometimes short
Capsules:
Length: 5-8 mm
Stipes: .5-2.5 mm
Hair: glabrous
Shape: ovoid
Styles: .5-1.8 mm
Stigmas: —
Stamens: 2, glabrous
Remarks: Flowers in May. Short branchlets have reduced leaves. Scales persistent in fruit.



reticulata



Salix reticulata L.
Snow Willow

Layperson's Tips: Shrub, dwarf, usually no more than 3.5 inches high. High elevations. Leaves have net-like veins beneath, rounded tips.

General

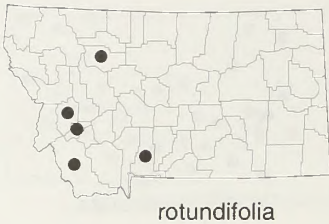
Synonyms: *S. nivalis* Hook.
Other common name(s): Creeping Willow, Netleaf Willow, Netted Willow, Thickleaf Willow
Pronunciation: re-tik-u- ('u' as in mute) LA ('a' as in fate) ta ('a' as in Persia)
Ecological Zone(s): Alpine, Subalpine
Habitat: Organic to gravelly, sandy soil; moist places with sparse vegetation, meadows, streams and lakesides, often on dryer sites than *S. arctica*, *S. cascadenis*, or *S. rotundifolia*.
Remarks: Common. Above treeline. Closely related to *S. vestita*, easily confused with *S. arctica*.

Vegetative Structures

Height: to 8 cm (3.5 in.)
Twigs: glabrous, sparsely hairy below catkins.
Mature Leaves:
Dorsal: long silky hairs, soon deciduous, dark green
Ventral: pale glaucous
Margin: entire, more less revolute.
Length: 1 to 3.5 cm
Width: 5 to 20 mm
Shape: elliptic to ovate to suborbicular to obovate to oblanceolate, tip rounded.
Stipules: minute, caducous
Remarks: Above treeline, leaves rounded, plants have rhizome-like stems; leaves prominently reticulate beneath, sometimes notched at apex, petioles yellowish.

Sexual Structures

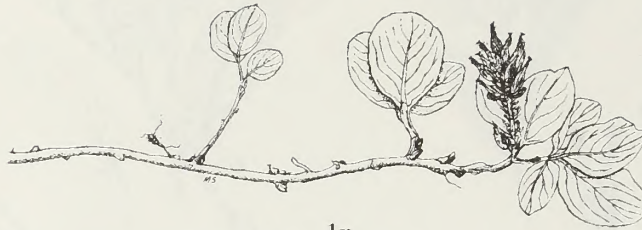
Catkins, General:
Emergence time: coetaneous to serotinous
Scale color: pale green to yellow
Scale Hair: glabrous to finely hairy
Catkins, staminate:
Length: .4-2 cm
Width: very slender
Catkins, pistillate:
Length: .5-2 cm
Branchlets: present
Capsules:
Length: 2-4 mm
Stipes: almost absent
Hair: gray pubescent
Shape: —
Styles: less than .5 mm
Stigmas: —
Stamens: 2, pubescent at base
Remarks: Often less than 15 capsules per catkin.



rotundifolia



5x



1x

Salix rotundifolia Trautv.
Dodge Willow

Layperson's Tips: Shrub, dwarf, usually no more than 3.5 inches high. High elevations. Leaves less than .3 inch long. Limestone areas.

General

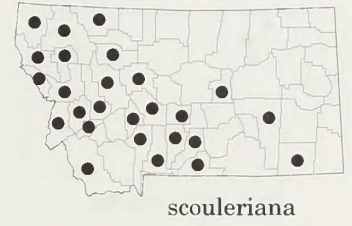
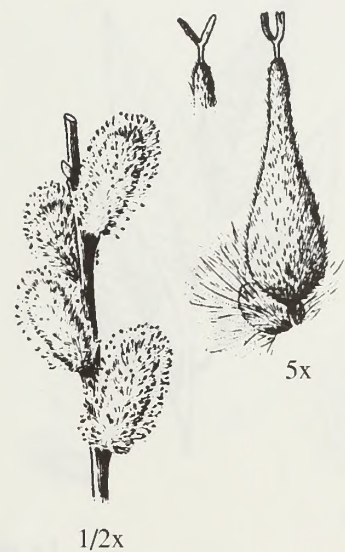
Synonyms: *S. dodgeana* Rydb.
Other common name(s): Creeping Willow, Least Willow
Pronunciation: ro- ('o' as in note) tun-di- ('i' as in pin) FOL- ('o' as in note) li-us
Ecological Zone(s): Alpine, Subalpine
Habitat: Moist open slopes, rocky ledges. Usually limestone substrata.
Remarks: —

Vegetative Structures

Height: to 8 cm (3.5 in.)
Twigs: —
Mature Leaves:
Dorsal: glabrous, glossy green
Ventral: same
Margin: entire, ciliate
Length: .3-.9 cm
Width: 2-5 mm
Shape: elliptic to oval to suborbicular
Stipules: —
Remarks: Mat forming above treeline, old leaves persist, leaves are very small and firm. Plant rhizomatous.

Sexual Structures

Catkins, General:
Emergence time: coetaneous
Scale color: purplish
Scale Hair: mostly glabrous
Catkins, staminate:
Length: very short
Width: —
Catkins, pistillate:
Length: very short
Branchlets: almost absent
Capsules:
Length: 3.5-4.5 mm
Pedicels: absent or almost absent
Hair: glabrous
Shape: ovoid
Styles: .2-.8 mm
Stigmas: bilobed, .5-1 mm
Stamens: 2
Remarks: Staminate catkins usually with only 3-4 flowers, pistillate catkins with 2-9 flowers.



scouleriana

Salix scouleriana Barr
Scouler Willow

Layperson's Tips: Shrub, medium to large; or small tree. Low to mid elevations. Upland rather than riparian. Last year's bark smells "skunky" when stripped.

General

Synonyms: —
Other common name(s): Fire Willow, Western Pussy Willow, Black Willow
Pronunciation: sco- ('o' as in note) ler-e- ('e' as in mete) ANA ('a' as in fate, 'a' as in Persia)
Ecological Zone(s): Foothills/Valley, Montane
Habitat: Moist forest floors, especially where the arboreal canopy has been opened.
Remarks: Often found in cut over, burned over or avalanche areas. Our most xeric willow. Common. Commercially available.

Vegetative Structures

Height: 3-15 meters (10-50 ft.)
Twigs: twigs of the year usually gray pubescent (sometimes velvety) to glabrous, pubescent, older yellowish to reddish brown to brown, dull.
Mature Leaves:
Dorsal: pubescent to glabrous, dull green
Ventral: glaucous, often finely rust colored pubescent, veiny
Margin: crenate to coarsely serrate to entire
Length: 2-9 cm
Width: 10-40 mm
Shape: usually oblanceolate to obovate, sometimes ovate.
Stipules: variable shape, deciduous
Remarks: Leaves thickish, sometimes have both rust colored and silvery hair. Bark light gray, smooth, or lightly fissured.

Sexual Structures

Catkins, General:
Emergence time: precocious to coetaneous
Scale color: blackish
Scale Hair: long, straight pubescent
Catkins, staminate:
Length: 2-4 cm
Width: —
Catkins, pistillate:
Length: 2.5 to 6 cm
Branchlets: absent or short
Capsules:
Length: 2.5-8 mm
Stipes: .8-3 mm
Hair: densely pubescent
Shape: ovoid
Styles: .4-.8 mm
Stigmas: bilobed, .5-1 mm
Stamens: 2, glabrous or sparsely pubescent at base.
Remarks: Flowers in May, one gland per flower.

Drawings courtesy of University of Washington Press. Map courtesy of Steve Chadde.



serissima



1/2x



1/2x



1/2x



5x

Salix serissima (Bailey) Fern.
Autumn Willow

Layperson's Tips: Shrub, usually medium. Low elevations. Leaves lighter beneath. Leaf stalks have glands at their tops. Catkins appear in summer, seed capsules are not hairy, more than 2 stamens.

General

Synonyms: —
Other common name(s): —
Pronunciation: SER-ris- ('i' as in pin) im- ('i' as in pin) ma ('a' as in Persia)
Ecological Zone(s): Plains, Foothills/Valley
Habitat: Organic soils, swamps, bogs, carrs.
Remarks: Considered sensitive in MT by The Nature Conservancy, extremely rare in MT, probably secure globally.

Vegetative Structures

Height: to 4 meters (to 13 ft.)
Twigs: gray to yellowish-brown, glabrous, shining
Mature Leaves:
Dorsal: glabrous, yellowish green to green, semi-glossy
Ventral: white glaucous to pale green
Margin: finely glandular-serrulate
Length: 4-10 cm
Width: 10-35 mm
Shape: elliptic to lanceolate to oblong-lanceolate, acute to short acuminate.
Stipules: rarely present
Remarks: Bark silvery, branches olive brown, plants rarely over 2 meters. Petioles glandular at summit.

Sexual Structures

Catkins, General:
Emergence time: serotinous, appear in mid to late summer
Scale color: light yellow
Scale Hair: pubescent, to 2.5 mm long.
Catkins, staminate:
Length: 1-4 cm
Width: —
Catkins, pistillate:
Length: 1.5-3 cm
Branchlets: present, leafy
Width: to 20 mm
Capsules:
Length: 7-12 mm
Stipes: —
Hair: glabrous
Shape: ovoid
Styles: Less than .5 mm
Stigmas: short, divided
Stamens: 3-5+, hairy on lower part of filament.
Remarks: Catkins unique in the fact that they appear so late; two glands per flower, capsules olive brown, cartilaginous.



Salix sitchensis Sanson
Sitka Willow

Layperson's Tips: Coarse shrub, medium to large; sometimes small tree. Mid elevations. Leaves with a satin sheen beneath. One stamen.

General

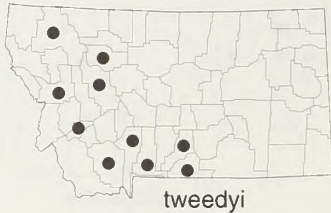
Synonyms: *S. coutleri* Andress.
Other common name(s): Silky Willow
Pronunciation: SIT-ka- ('a' as in Persia) en-sis
Ecological Zone(s): Foothill/Valley, Montane
Habitat: Well drained streambanks to wet shrub basins. Sometimes relatively dry, rocky places. Does poorly in bogs.
Remarks: May hybridize with *S. drummondiana*, especially when male plants are absent. Indians of Alaska burn it to dry fish because its smoke has no odor.

Vegetative Structures

Height: 2-7 meters (6-23 ft.)
Twigs: velvety-puberulent to velvety-tomentose, yellowish brown becoming grayish
Mature Leaves:
Dorsal: sparsely gray pubescent to glabrous, green
Ventral: silvery pubescent, paler green
Margin: mostly entire, callous glands on margin
Length: 4-9 cm
Width: 15-35 mm
Shape: mostly obovate to oblanceolate, sometimes elliptic to lanceolate
Stipules: small to caducous to well developed, persistent on vigorous shoots.
Remarks: Bark smooth, gray

Sexual Structures

Catkins, General:
Emergence time: precocious to coetaneous
Scale color: light brown to blackish, darkening at the apex.
Scale Hair: long pubescent
Catkins, staminate:
Length: 2.5-5 cm
Width: —
Catkins, pistillate:
Length: 3-9 cm
Branchlets: .5-2 cm long with reduced leaves
Capsules:
Length: 3-5.5 mm
Stipes: .5-1.4 mm
Hair: densely silvery pubescent
Shape: —
Styles: .3-1.2 mm
Stigmas: .2-.3
Stamens: 1; stout, glabrous
Remarks: Single stamen is unique, formed by the fusion of two stamens.



tweedyi



1x



1x



5x

Salix tweedyi Bebb. (ex. Rose) Ball
Tweedy Willow

Layperson's Tips: Shrub, usually large. Mid to high elevations. Leaves almost the same color on both surfaces, wide in relation to length, often hairy on top but always hairless beneath. Twigs have long hairs. Small leaflike structures at the base of the leaf stalks (stipules).

General

Synonyms: *S. barrattiana* Hook var. *tweedyi* (Bebb.)

Other common name(s): —

Pronunciation: TWEED- e- ('e' as in mete) i ('i' as in pie)

Ecological Zone(s): Alpine, Subalpine, Montane

Habitat: moist, lighter, coarse well drained soils. Along streambanks and lake shores.

Remarks: Uncommon.

Vegetative Structures

Height: to 4.5 meters (15 ft.)

Twigs: stout, long spreading pubescence

Mature Leaves:

Dorsal: long, spreading pubescent to glabrate

Ventral: essentially glabrous, slightly lighter than dorsal, not glaucous

Margin: finely glandular serrulate, rarely subentire

Length: 4-9 cm

Width: 20-50 mm

Shape: elliptic to broadly elliptic to elliptic-ovate to obovate

Stipules: well developed, foliaceous, 5-12 mm

Remarks: —

Sexual Structures

Catkins, General:

Emergence time: precocious to coetaneous

Scale color: blackish

Scale Hair: long pilose

Catkins, staminate:

Length: 2-4 cm

Width: 15-20 mm

Catkins, pistillate:

Length: 2-8 cm

Branchlets: absent

Capsules:

Length: 4.5-7 mm

Stipes: .2-1 mm

Hair: glabrous

Shape: —

Styles: 1-3 mm, stipes .2-1 mm

Stigmas: —

Stamens: 2

Remarks: Some pistillate catkins at the ends of twigs of the previous year. Scales persistent in fruit.



vestita



Salix vestita Pursh
Rock Willow

Layperson's Tips: Crooked, stout, angular shrub; small. High elevations. Leaves leathery with distinct venation (see drawing).

General

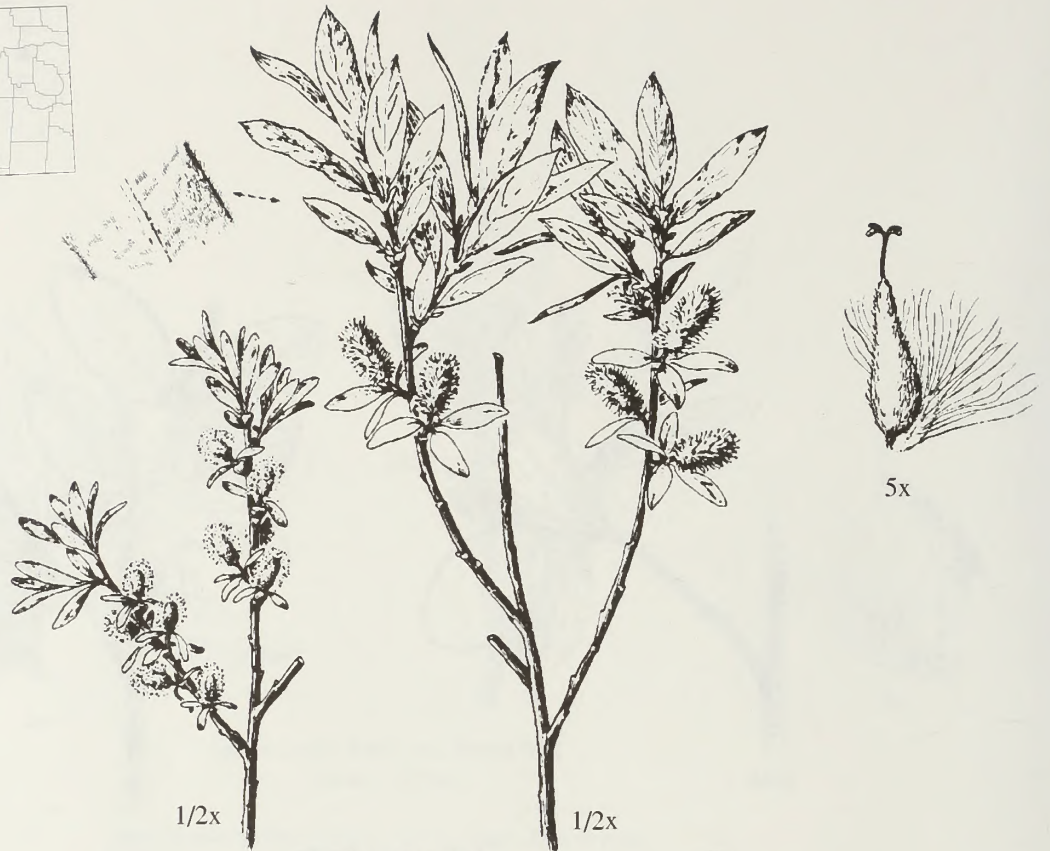
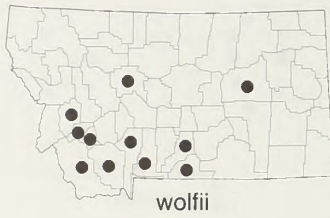
Synonyms: —
Other common name(s): —
Pronunciation: ves-TE ('e' as in mete) ta ('a' as in Persia)
Ecological Zone(s): Alpine, Subalpine
Habitat: Moist stony soil or moist rock outcrops, may be more common on wet organic soil. Open places, sometimes springy areas.
Remarks: Closely related to *S. reticulata*.

Vegetative Structures

Height: mostly less than 1 meter (3 ft.), rarely 2 meters (6.5 ft.)
Twigs: glabrous to villous to puberulent.
Mature Leaves:
Dorsal: soon glabrous, dark green
Ventral: glaucous, silvery villous becoming glabrate
Margin: slightly revolute, very small gland teeth to entire
Length: 2-6 cm
Width: 10-40 mm
Shape: elliptic-ovovate to elliptic-ovate to oval
Stipules: absent
Remarks: Leaf hair changes with age.

Sexual Structures

Catkins, General:
Emergence time: serotinous
Scale color: brown
Scale Hair: villous
Catkins, staminate:
Length: 1.5-3 cm
Width: 5 mm
Catkins, pistillate:
Length: 1-5 cm
Branchlets: present
Capsules:
Length: 2-5 mm
Stipes: absent
Hair: villous
Shape: ovoid
Styles: short or lacking
Stigmas: bilobed
Stamens: 2, hairy at base
Remarks: At least some catkins terminating twigs of the season, two glands per flower (one is very small).



Salix wolfii Bebb
Wolf Willow

Layperson's Tips: Shrub, usually small. Mid to high elevations. Leaves the same on both sides, have silvery hair which lays close to them (as opposed to sticking out).

General

Synonyms: —
Other common name(s): —
Pronunciation: WOLF- e ('e' as in mete) i ('i' s in pine)
Ecological Zone(s): Subalpine, Montane
Habitat: Swamps, wet meadows, bogs, occasionally along streams. Wet organic soils.
Remarks: Var. *idahoensis* Ball is common; var. *wolfii* is considered sensitive by The Nature Conservancy; extremely rare in MT, apparently globally secure. Var: *Wolfii* is found in Deer Lodge and Madison Counties. Difficult to tell from *S. commutata* and *S. eastwoodiae*.

Vegetative Structures

Height: .6-2 meters (2-7 ft.)
Twigs: Twigs of the first year-thinly villous, puberulent
Mature Leaves:
Dorsal: often densely appressed silvery-pubescent, green
Ventral: same
Margin: entire
Length: 2-6 cm
Width: 7-20 mm
Shape: elliptic to ovate to oblanceolate
Stipules: foliaceous, 1-7 mm, sooner or later deciduous
Remarks: 2 meters (6 ft.) high only when not grazed, leaf veins inconspicuous.

Sexual Structures

Catkins, General:
Emergence time: coetaneous
Scale color: dark brown to blackish
Scale Hair: woolly villous
Catkins, staminate:
Length: .8-2 cm
Width: less than 10 mm
Catkins, pistillate:
Length: .8-2 cm
Branchlets: present, leafy
Capsules:
Length: 3.5-5 mm
Stipes: less than 1 mm
Hair: var. *idahoensis* villous; var *wolfii*, glabrous;
Shape: —
Styles: ..2-1.9 mm
Stigmas: bilobed
Stamens: 2
Remarks: Scales persistent in fruit.

A Glossary Designed Especially for Use in Willow (*Salix*) Identification

- Acuminate - Refers to a kind of leaf tip: long, gradually tapering to a sharp point and concave sides.
- Acute - Refers to a kind of leaf tip: ending quickly in a sharp point.
- Ament - Syn. catkin; cluster of unisexual flowers; dense, elongate.
- Anther - Pollen bearing sac, mounted on a filament.
- Appressed - Lying close to and flattened to the surface.
- Axes - Plural of axis.
- Axis - Main longitudinal (right angle to horizontal) support structure in a catkin from which flowers arise.
- Bicarpellate - Having two carpels.
- Bilobed - Two lobed, cleft.
- Bog - A wetland that develops in a depression, such as a lake with poor drainage. Generally characterized by extensive peat deposits, acidic water, floating sedge or Sphagnum mats, heath shrubs, and often, by the presence of coniferous trees. The water table is usually close to the surface without standing water (except where there are open ponds). A peat-filled or peat-covered area.
- Bract - Modified, reduced leaf; located just below a catkin on a branchlet. Not to be confused with scales (floral bracts) which are part of the catkin. Some works refer to scales as bracts.
- Branchlet - See floriferous branchlet
- Caducous - Falling off early in the yearly development of a plant.
- Callous, Callus - Tissue that forms over a cut or damaged plant surface.
- Calyx - The outer group of floral leaves (petals).
- Capsule - A dry fruit; opening by slits or valves, has more than one seed bearing unit.
- Carpel - Ovule bearing part of a pistil.
- Cartilaginous - Resembling the consistency of cartilage.
- Carr - Wetlands that occur on organic soil composed of minerotrophic peat. They have greater than 25 percent shrubs that may form very dense cover creating thickets, or the overstory may be open. Usually there is abundant water which retards decomposition of peat.
- Catkin - Syn. ament (see above). Note that most staminate catkins are sessile and most pistillate catkins are peduncled.
- Ciliate - Refers to leaf edge: fringed with hairs.
- Coetaneous - Refers to catkins: appear at the same or about the same time as the leaves open.
- Conic - Cone shaped.
- Crenate - Refers to a leaf margin: toothed, shallow rounded teeth, "scalloped."

Deciduous - Falling off after completion of its function.

Divaricate - Widely divergent, forked.

Dorsal - The top side (of a leaf) under normal field circumstances.

Elliptic - Refers to leaf, etc., shape: widest in the middle, tapering equally to both ends (which are often rounded); shaped like an ellipse.

Entire - Refers to the edge of a leaf, etc.: without teeth or glands, completely smooth.

Facultative - Optional, not absolutely required.

Fen - This is a European term applied to graminoid dominated minerotrophic peatlands. The water table is at, or close to, the surface most of the time and may be acidic or basic.

Filament - Thread like stalk which supports the anther.

Floriferous Branchlet - A small branch, usually with leaves that are sometimes reduced, that holds a catkin.

Floral Bract - See scale.

Foliaceous - Leaf like.

Glabrous - Without glands or hairs, not pubescent.

Glabrate - Nearly glabrous or becoming glabrous.

Glaucous - Slight glaucous

Glaucous - Covered with a whitish, waxy layer which rubs off easily.

Glutinous - Having a sticky or slimy surface.

Graminoid - Grass, sedge, rush, bullrush, reed, or cattail.

Hydric - Refers to soil: has an abundant supply of water.

Krummoltz - A growth form found in alpine situations (above the timberline). Trees that would normally be straight and tall that are stunted, shrubby, and low, often 1 meter or less high.

Lanceolate - Refers to leaf shape: spear (lance) shaped with the widest part near the base.

Locally Common - Found only in certain places (locales), but common when found.

Linear - Refers to leaf, etc., shape; long and narrow with parallel edges.

Marsh - A wetland on a mineral soil that is dominated by graminoids. Waters are neutral or basic.

Mesic - Refers to soil: moist, but water is not abundant (not hydric).

Minerotrophic - Has a water source which has been in contact with mineral soil and therefore provides a much greater supply of nutrients.

Oblanceolate - Refers to leaf: spear shaped with the widest part near the tip.

Obligate - Required.

Oblong - Refers to the leaf shape; longer than wide, nearly parallel sides.

Obovate - Refers to the leaf shape: egg shaped with the narrow part near the base.

Obsolete - Wearing out or disappearing.

Ovary - The part of the pistil that becomes the fruit.

Ovate - Refers to leaf shape: egg shaped with wider part near the base.

Ovoid - Refers to capsule: egg shaped with wider part near base.

Pendulous - Hanging down.

Petiole - Leaf stalk.

Phreatophytic - Possessing deep roots which take water from the water table.

Pilous - Covered with soft, distinct, thin hairs.

Pistil - Female part of a flower, differentiated into ovary, style, and stigma.

Pistillate - Refers to female catkins; catkins that have female parts but no male parts.

Precocious - Refers to catkins: appearing before the leaves open.

Pruinose - Having a bluish-purplish waxy, powdery secretion on the surface, "blue-stem willows."

Puberulent - Having tiny, barely visible hairs.

Pubescent - Having any kind of hair: i.e., pilous, puberulent, tomentose, villous, etc.

Pyric Disclimax - Disclimax resulting from repeated fire, fire disturbance climax, stage in plant succession replacing or modifying true climax because of fire.

Reticulate - Refers to leaf venation: like a network, has many interconnections.

Revolute - Refers to leaf margins: rolled toward the ventral side.

Rostrate - Beaked.

Rugous - Wrinkled.

Scale - Syn. floral bract. A nongreen structure associated with each flower of a catkin. Some works refer to scales as bracts.

Sericeous - With many long, straight, soft appressed hairs giving a silky appearance.

Serotinous - Refers to catkins: appearing after the leaves.

Serrate - Refers to leaf edge; toothed.

Sessile - Sitting directly on base without a supporting stalk, petiole, or peduncle.

Shrub, large - Woody plant with no single main stem, 3 meters or more tall.

Shrub, low - Woody plant with no single main stem up to 8 cm tall.

Shrub, medium - Woody plant with no single main stem, 1 to 3 meters tall.

Shrub, small - Woody plant with no single stem, 8 cm to 1 meter tall.

Stamen - Male part of a flower, divided into the anther and a filament.

Staminate - Refers to catkins: catkins that have male parts but no female parts.

Stigma - The top part of the pistil. Receives the pollen.

Stipe - The stalk that bears the pistil or fruit, between the scale and the pistil/fruit.

Stipule - A paired appendage found at the base of a petiole.

Style - The part of the pistil which separates the stigma from the ovary. Usually elongated.

Superior - Refers to ovary; ovary placed above the scales.

Synonymy - Replaced by another name.

Timberline - Transition zone from forest to alpine meadows and/or rockland.

Tomentose - Covered with tangled, matted, wooly hairs.

Twig of the year (season).

Twig of the previous year.

Twig of the third season of growth.

Vegetative - Nonsexually reproductive parts of a plant—leaves, stems, roots, etc., not synonymous to vegetation.

Ventral - The bottomside (of a leaf) under normal field conditions.

Villous (Villose) - Having long, soft hairs that are not matted.

APPENDIX A

Index of Preferred Common Names

Arctic Willow - *S. arctica* –
Autumn Willow - *S. serissima*
Barclay Willow - *S. barclayi*
Barratt Willow - *S. barrattiana*
Bebb Willow - *S. bebbiana* –
Booth Willow - *S. boothii* –
Cascade Willow - *S. cascadenis* –
Crack Willow - *S. fragilis* –
Dodge Willow - *S. rotundifolia*
Drummond Willow - *S. drummondiana* –
Eastwood Willow - *S. eastwoodiae*
Farr Willow - *S. farriae*
Geyer Willow - *S. geyeriana* –
Gray Willow - *S. glauca* –
Hoary Willow - *S. candida*
Laurel Willow - *S. pentandra* –
Lemmon Willow - *S. lemmonii*
Meadow Willow - *S. petiolaris*
Mountain Streambank Willow - *S. melanopsis*
One Colored Willow - *S. monochroma*
Pacific Willow - *S. lasiandra*
Peachleaf Willow - *S. amygdaloides* –
Planeleaved Willow - *S. planifolia* –
Pussy Willow - *S. discolor*
Rock willow - *S. vestita*
Scouler Willow - *S. scouleriana* –
Serviceberry Willow - *S. pseudomonticola*
Sitka Willow - *S. sitchensis*
Short Fruit Willow - *S. brachycarpa*
Snow Willow - *S. reticulata* –
Streambank Willow - *S. exigua* –
Tweedy Willow - *S. tweedyi*
Undergreen Willow - *S. commutata*
Yellow Willow - *S. lutea* –
Weeping Willow - *S. babylonica*
White Willow - *S. alba*
Wolf Willow - *S. wolfii* –

APPENDIX B

Range Maps

The maps were prepared independently by Steve Chadde, USDA, Forest Service (RAWE), Missoula, Montana, and Robert Dorn, Mountain West Environmental Services, Cheyenne, Wyoming. Between the two sources, we were able to get maps for most willow species in Montana. Lesica and Shelley (1991) provided information that enabled us to make maps for the species considered sensitive by The Nature Conservancy (Barratt Willow, Cascade Willow, Autumn Willow, and a variety of Wolf Willow). Therefore, we have maps for all species except for exotic species and those that we are not completely certain are in Montana—Lemmon Willow and Meadow Willow.

We have not included maps for the exotic species—White Willow, Weeping Willow, Laurel Willow, and Crack Willow because they may have been planted anywhere there is or was human habitation. Maps would have told little of their tolerances and where they might be encountered in the wild.

Species which have been verified in or reliably reported in a given county are denoted by a solid black disk in that county on the map. An unverified report is denoted by an open circle.

APPENDIX C

Ongoing Taxonomic Work With the Genus *Salix*

Diamond or Missouri Willow (*S. eriocephala* Michx), Yellow Willow (*S. lutea* Nutt.), One Colored Willow (*S. monochroma* Ball), Mackenzie Willow (*S. rigida* var. *mackenzieana* (Hook) Cronq.), *S. mackenzieana* (authority unknown), *S. prolixa* (authority unknown), and other taxa are very similar and have caused considerable confusion. Robert Dorn is presently working with the group, but is not yet completed. He feels that they all should be lumped in the same species, *S. eriocephala*. It will have two subspecies and three or four varieties. The names for these will not be available for the foreseeable future.

Streambank Willow (*S. exigua*) and Mountain Streambank Willow (*S. melanopsis*) have also caused problems. The two species overlap and may hybridize. Steven Brunsfeld is working on this group.

For the sake of consistency, we will continue to use the species that Dr. Dorn has in his two excellent publications, *Vascular Plants of Montana* (1984), and *Vascular Plants of Wyoming* (1988). These are: Yellow Willow (*S. lutea*) and One Colored Willow (*S. monochroma*) for the *S. eriocephala* group, and Streambank Willow (*S. exigua*) and Mountain Streambank Willow (*S. melanopsis*) for Dr. Brunsfeld's group.

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